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airlift

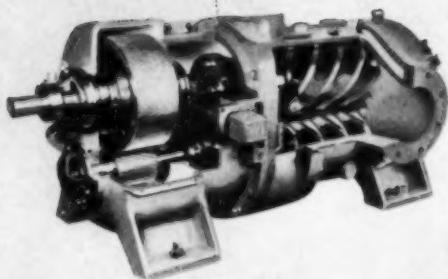
In This Issue:

A CLOSE LOOK AT MERGER TALK
WHAT THE FARE DECISION MEANS
CAPITAL'S TOP-LEVEL SHAKUP

WORLD AIR TRAVEL GUIDE



From Stratos... **NEW GROUND**
STARTING UNIT FOR
TURBINE AIRCRAFT



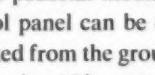
The Model GSA-10 *Stratosair* offers airline and military operators today's most economical and effective means of providing a continuous ground air supply for turbojet and turboprop aircraft. Heart of the *Stratosair* is a unique Heli-Rotor compressor that provides the output required for engine starting for any current aircraft. The unit also can provide warm air for deicing and a continuous supply of air for air conditioning, heating and check out of pneumatic systems.

The Heli-Rotor combines the non-surge characteristics of a positive displacement compressor with the high delivery rate at low weight and small size of high speed aerodynamic machines.

The Heli-Rotor has recommended overhaul time of 10,000 hours. With a standard industrial engine as the driving medium, overhaul costs and parts stocking are slashed to a minimum—to less than 30% of gas turbine compressors. Initial cost is competitive with truck-mounted turbo-compressors. The requirements of turbofan engine can be met by the present Heli-Rotor compressor with a more powerful driver since it is being operated well below its design capacity in the GSA-10.

The illustration shows the Heli-Rotor pack mounted on a standard International 1½-ton truck. It can be provided on a skid mount, on a simple trailer mount or mounted on any of a variety of suitable trucks.

The compressor drive is an International UV549 V-8 engine. The engine-compressor package has its own cooling sys-



tem. A pedestal-mounted control panel can be operated from the ground or swing 90° to permit operation from the driver's seat. Discharge pressure regulation is automatic with double protection provided by an additional valve that unloads the compressor if normal operating pressure is exceeded.

*For complete data
on Heli-Rotor Compressor package, write to*

STRATOS
A DIVISION OF FAIRCHILD ENGINE & AIRPLANE CORPORATION

Main Plant: Bay Shore, Long Island, N. Y. • Western Branch: 1800 Rosecrans Ave., Manhattan Beach, California



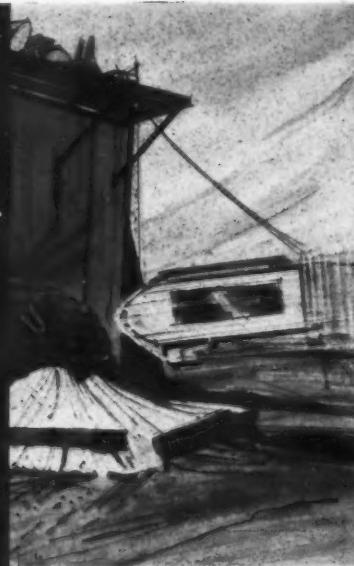
Furious or Peaceable, any fuel travels better in Goodyear fuel cells

BUILDING fuel cells for conventional fuels is one thing. But strait-jacketing the new "furious fuels" that power space-probing rockets is another. And the ability to achieve success in both measures the long-established leadership of Goodyear in the science of airborne fuel management. This proved capability is now serving both commercial and military aviation, as well as the vanguard of our space pioneers. For details on Goodyear advances in fuel cell technology, write on company letterhead to The Goodyear Tire & Rubber Company, Aviation Products Division, Dept. R-1735, Akron 16, Ohio.



**FITS IN A HATBOX,
HOLDS 100 GALLONS**

Light, spacesaving bladder-type cell by Goodyear slips through small access doors, is then filled. Design uses "free space" that's otherwise unusable.



**SAFETY CELL—FIRST
CRASH-RESISTANT TANK**

Major advance in air safety, new Goodyear tank withstands 35-G impact, promises to reduce danger of vaporized fuel combustion, increase safety margin in crash.



**TAMING "WILD" FUELS
FOR MISSILE BOOSTERS**

Volatile exotic fuels to drive satellites into orbit call for new types of containers. Here Goodyear engineers test advanced expeller, bladder-type cell.

Lots of good things come from

GOOD  **YEAR**

Safety Cell—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

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jets

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A Silent Servant of Safety, this equipment is installed on fueling facilities serving most of the world's major airports. It is approved and in production for the U. S. Air Force under recent contracts. For further information, write Aviation Products division, Warner Lewis Company.

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WORLD AIR TRANSPORTATION

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This Month's Cover—Engine intake behind the wing, a view to be had only on Sud Aviation's twin-jet Caravelle (shown circling Athens) but fast becoming the trend in new transport design. Among major projects under development using the aft-mounted engines are Boeing's 727, Britain's Airco DH-121, Vickers VC-10 and -11, the Lockheed JetStar and North American Sabreliner.

World's quietest, most
airliner...

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by Douglas, Sud Aviation's
Caravelle offers
jet transportation on routes
impractical for the long range jetliners

Designed and built by **SUD AVIATION**

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jetliner

After exhaustive investigation and testing, the Douglas Aircraft Company can recommend Sud Aviation's *Caravelle* jetliner as the world's finest medium range airliner.

This luxurious jetliner—C.A.A. approved—has been manufactured and tested in accordance with the most modern techniques. *Caravelle* has proved in more than a year of airline operation overseas that it is outstanding in performance, economy,

ease of maintenance and passenger acceptance.

Its rear fuselage-mounted twin engines put the jet exhausts behind all passengers, resulting in aviation's quietest cabin. Stability is excellent, vibration non-existent.

Caravelle's high rate of climb and high cruising speed make it ideal for routes from 200 to 1400 miles. It is an aircraft that fits the Douglas tradition ...dependable, durable, and an airline profitmaker.

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JUNE, 1960

BENDIX BRAKES-

SURE GROUND CONTROL FOR 150-TON GIANTS

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built to meet the extra-heavy ground control demands of these high-performance aircraft. In fact, "Brakes by Bendix" signifies safe, sure ground control—whatever the aircraft.

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JUNE,

Have We Abandoned Aeronautics for Space?

Transfer of government and military attention from manned aircraft to missiles and space has left U.S. civil and commercial aviation up a dry creek.

The missile/space race is of the utmost importance. But the U.S. is in danger of losing out in aeronautical development.

It seems to be traditional for the U.S. to shift from one extreme to another. All or nothing. But in shifting all-out to missiles and space, it has created a crisis in aeronautics. Basic research and development has virtually been abandoned.

But there is ample evidence that the Soviet Union, Great Britain and France have not done so in like manner.

It is the manned airplane that holds the greatest long-range benefit to mankind the world over. It is having and will have the greatest impact on world politics and economics. It has just begun to be implemented throughout the world.

Yet we in the United States are abandoning the heritage of development which gave us leadership in the air. The assumption seems to be that the manned airplane is at its peak of development.

Nothing could be farther from the truth. Continued basic research in aeronautics is urgently necessary.

Here are a few examples of the plight of the manned airplane:

- The National Advisory Committee for Aeronautics which contributed so much to aeronautical research, is now the National Aeronautics and Space Administration with an overwhelming emphasis on space.
 - Wind tunnels, such as Cal-Tech and Cornell, have closed down, along with many other aeronautical research facilities.
 - Advanced airplane designs (except for the B-70) have no further interest to the Air Force. Missiles and other space weapons have taken over, as they should for military purposes.
 - Industry research and development in aeronautics has declined all across the board from major airframe builders to manufacturers of engines and accessories. In some instances aeronautics activities have all but ceased.
 - Reservoirs of pilots and mechanics are drying up. The military backlog of talents is drying up. Air carriers face a serious problem ahead.
- • •

Now let's examine two major areas of aircraft development now under current discussion. One is the supersonic airplane, the other is cargo.

It is all well and good to have Congressional hearings calling for the development of a supersonic trans-

port, but it isn't all that easy to bring about. Tens of millions of dollars in basic research are necessary, perhaps several hundred million. Who will perform the service? USAF's delayed B-70 can make certain tangible contributions, but this is far from enough. The noise problem alone will keep the supersonic transport in the study stage for a long time. The British are far ahead of us in basic noise research. Obviously industry cannot conceivably undertake to finance a supersonic program in its entirety. It becomes a government job. But how, and through what agency? And in industry a reservoir of talents available several years ago has been dissipated.

Take the cargo airplane. The Army has set about to draft its requirements for airlift with a maximum amount of ignorance and illogical thinking. It wants one set of specs to perform all airlift functions—long-range, short-range, and so forth. A single cargo plane indeed! Impossible! What is needed is three or four types of cargo planes for as many different uses. One is needed for long-range high-altitude operations. Another for short-haul with landing and take-off characteristics of utmost importance. Another for purely localized operations. And perhaps a fourth for heavy-capacity general utility work. But with USAF's major attention on missiles and space, and the Army fuzzy about the airplane itself, who is going to take the leadership to carry aeronautical techniques into the vast cargo/airlift field?

There is still another area being overlooked. Able men like Bill Littlewood, American Airlines' vice president of equipment research, have pointed out that there isn't a single new commercial airplane or engine today at its optimum stage of development. Performance and efficiency can still be improved across the board. Yet virtually no effort is being applied, as in the era of piston-engined equipment, to continue research and development either by government or industry.

All of this is a serious and growing national problem. For three or four decades government, military, industry and operators all worked toward a single goal of developing and improving the manned airplane. Today the operators stand almost alone at a time when aeronautical development is far from reaching its zenith. Is the U.S. to sit back and see its leadership pass to other countries in the East and the West?

The spring is drying up rapidly. Who has the solution?

Wayne W. Parish



Flight Propulsion

880's START COMMERCIAL SERVICE

CJ-805's Power Delta Jetliners

Atlanta, Ga.—General Electric engines entered commercial service for the first time on May 15 when Delta Air Lines Convair 880 Flight #873 left New York's Idlewild Airport bound for New Orleans' Moisant International Airport.

DAL Flight #873 was the world's first 880 passenger service. It inaugurated Delta jet service to New Orleans.

The second 880 flight left the ground while the first was still in the air, and Delta 880 service was fully underway.

A pre-service Delta flight demonstrated the capabilities of the fastest and the newest of the jets.

Delta's first 880 established a new coast-to-coast speed record on its recent initial cross-country pre-service flight. The 880 "Delta Queen" flew the 2359 miles from San Diego to Miami in 3 hours, 31 minutes, and 54 seconds.

Average ground speed for the record-breaking flight was 665 miles per hour.

Delta President C. E. Woolman, aboard for the flight, said, "This new



southern transcontinental speed record clearly establishes the General Electric-powered Convair 880 as the queen of the skies. The aircraft performed magnificently and fully measured up to my expectations for both plane and engine."

More information on Convair 880s powered by General Electric jet engines is found in GED-4192. See coupon.

IT'S A SWEET AIRPLANE—C. E. Woolman (left), Delta Air Lines President, discusses coast-to-coast record-breaking flight with T. P. Ball, Delta's chief pilot.



General Electric's T58 Turboshaft Engine Completes 2000-Hour Endurance Run

Lynn, Mass.—General Electric's 1050-shp T58 turboshaft engine recently completed 2000 hours of endurance running. The grueling test, designed to determine T58 parts life expectancy, simulated the demands which the engine would face during 4000 typical 30-minute helicopter missions. In all, 4000 starts and 12,000 burst accelerations were made. Condition of parts

was excellent.

Developed for the U.S. Navy, the T58 is now in production and has accumulated more than 30,000 hours of total running time. Military applications include the Navy's HSS-2 and HU2K helicopters, the Army YHC-1A, and two experimental vertical take-off and landing (VTOL) aircraft, the Kaman K-16 and Fairchild M224.

2000-HOUR ENGINE INSPECTED—M. C. Hemsworth, G-E Small Aircraft Engine Department Manager of Engineering (right), examines T58 compressor with evaluation engineer J. W. Wills.



The engine's commercial counterpart, the CT58, has been selected to power Sikorsky S-61s, ordered by Los Angeles Airways and Chicago Helicopter Airways and Vertol 107s, which New York Airways plans to use. The CT58 also powers Sikorsky's S-62 single-engine amphibious helicopter being offered to corporate charter and airline users.

More detailed information on the T58 program is found in GED-3985. See coupon.

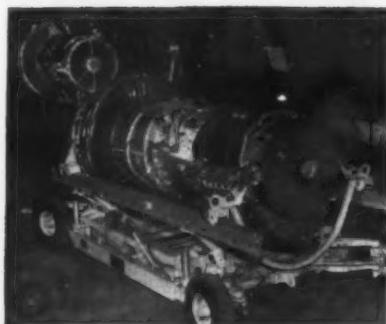
J85-7 Powers GAM-72 To New Altitude

Holloman Air Force Base, N. M.—McDonnell's GAM-72 decoy missile successfully completed its first free flight recently with General Electric's J85-7 production turbojet, the engine slated to power the "Green Quail" when it enters service with the Strategic Air Command. Air launched at operational altitude from a B-52 bomber, the missile completed its automatically-programmed flight without incident, reaching the highest altitude of all flights to date.

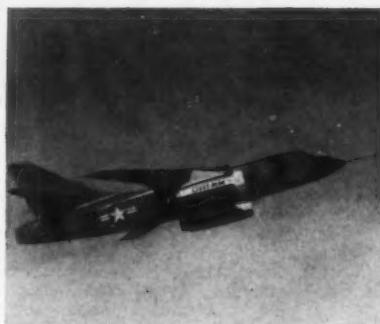
Although the GAM-72 has been free-flown with a development J85 engine, this was the first in a series of mission simulation flights aimed at paving the way for release of the production missile system to operational SAC squadrons.

J85 engines have now compiled more than 11,000 total test hours.

More information on G.E.'s J85 production turbojets, for "Green Quail" and other applications, is available in GED-4096. See coupon.



CJ-805-23 ENGINES POWER FLIGHT—
General Electric's aft fan engines power the B-66.



B-66 POWERED BY AFT FAN ENGINES—
G-E leased aircraft in flight, fitted with Convair 600 nacelles.

CJ-805-23 Highly Successful: 1st U.S. All-Turbofan-Powered Flight

Edwards AFB, Calif.—For the first time an engine manufacturer flew turbofan engines as primary powerplants when General Electric successfully flight-tested two CJ-805-23 engines recently. A G-E leased Air Force B-66 flew for one hour and 40 minutes at altitudes up to 35,000 feet, and speeds up to Mach .85.

Flight tests are continuing with outstanding success.

Both engines are mounted in Convair 600 production nacelles. Through these tests, General Electric will supply significant data on the pods, before the 600 flies for the first time.

The aft fan CJ-805-23s underwent extensive ground tests in Convair nacelles before the historic flight.

Convair 600s, equipped with the CJ-805-23s, have been ordered by American Airlines, Scandinavian Airlines System, Swissair and REAL (Brazil).

As part of its continuing aft fan flight test program, General Electric recently purchased a Caravelle VII from Sud Aviation. Wind tunnel tests of the Caravelle aft fan nacelles have already begun. Flight tests will begin in early Fall, leading to early certification of the aft fan-powered jet.

If you'd like additional information about any of G.E.'s aft fan engines, mail the coupon below. For CJ-805-23 information, GED-4192; CF-700, GED-3986; TF-35; GED-4098.



4000-LB THRUST AFT FAN IS UNVEILED
—This is the first full-scale mockup of General Electric's new CF700 turbofan engine, recently announced as the first small aft fan engine specifically designed for light- and medium-weight aircraft being offered to corporate, military and airline users. Being developed under G-E sponsorship, the CF700 combines the J85 gas generator and a scaled-down version of the CJ-805-23 aft fan to produce 4000 lbs thrust with a 0.69 SFC. Flightworthy engines will be available in April, 1961; FAA-certified engines in February, 1962. More CF700 information is contained in GED-3986.

FAA Awards CT58 Production Certificate

Lynn, Mass.—General Electric's Small Aircraft Engine Department has been awarded the first original helicopter gas turbine production certificate to be granted by the Federal Aviation Agency. The certificate authorizes quantity production of G.E.'s CT58-100 commercial helicopter engine without FAA inspection of each individual powerplant.

The engine itself was certified by the FAA for commercial helicopter service on July 1, 1959.



PRODUCTION CERTIFICATE AWARDED—
G-E Small Aircraft Engine Department General Manager Gerhard Neumann (left) accepts production certificate number 107 from Walter H. Ross of FAA.

The advantages of CT58-powered commercial helicopters are described in detail in G.E.'s illustrated brochure, GED-3987. See coupon below.

FOR MORE DETAILED INFORMATION on these and other developments in General Electric aircraft powerplants, contact your nearest G.E. Flight Propulsion Division representative or indicate below the brochures you would like to receive.

General Electric Company
Section B206-11
Schenectady 1, New York

- GED-4192, "CJ-805 Progress Report"
- GED-3986, "CF700-1 Turbofan"
- GED-4098, "Aft Fan Flight Test Report"
- GED-3985, "T58 Progress Report"
- GED-3987, "CT58 for Commercial Helicopters"
- GED-4096, "J85 Progress Report"

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Company _____

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LETTERS

Oakite 74 Safe on Aluminum

To the Editor:

My attention has been brought to the story on page 57 of your March issue concerning the plane washing operation at Western Air Lines.

We were happy to have the story note that Western uses an Oakite 74 solution for this purpose. We were chagrined however, to read that it is necessary to use an inhibitor with the compound to make it safe on aluminum. This is not so. Western treats the water feeding into the steam generator to change it from acid to alkaline to prevent damage to the generator coils. This treatment takes place before steam is generated; it has nothing to do with Oakite 74.

Oakite 74 in fact has long been used to clean aluminum surfaces in many locations. I know of no place where it has been necessary to add an inhibitor to the solution.

Could we ask you to clarify this for your readers? Thanks very much.

A. T. THIBADEAU
Public Relations
Oakite Products, Inc.
New York 6, N.Y.

Defense of IAM

To the Editor:

AIRLIFT's reference to IAM and its failure to take part in safety matters

appears a bit unfair. While we have no axe to grind for IAM, I think that the person who wrote those comments should explore the matter more deeply before reaching any further conclusions.

IAM does work for air safety. Many ramp procedures and hangar floor procedures are the result of collective bargaining. In many industries the gains in safety are obtained through collective bargaining. ALPA has made many contributions to safety through collective bargaining which could not be obtained in other ways. It is not the most desirable technique, but it does work for safety.

IAM doesn't have a good press, nor does it advertise but the contribution of the aviation mechanic to safety should not be measured in terms of public relations. Read the article in the recent issue of "Approach" about getting off the mechanic's back.

R. E. COMMERCE, President
Air Line Dispatchers Assn.
Arlington, Va.

Applause

To the Editor:

I have been on the go so much in the past many weeks, that this is the first chance I have had to sit down and write you a note to thank you for the splendid article (*AIRLIFT*, April) you did on our company. We have received many com-

ments and letters as a direct result of the story and I want you to know how much we sincerely appreciate the fine job you did.

E. B. JEPPESEN
President, Jeppesen & Co.
Denver 8, Colorado

No Penalty for High Wings

To the Editor:

We note in the April issue of *AIRLIFT* magazine that your comments in "Trends" resolve the current controversy over the future freighter configuration to a matter of loadability requirement. Although we would agree that optimum loadability requires a high wing configuration, we would not agree that this results in economic penalties compared to the low wing aircraft. As evidence of this, we would note that there are currently some thirteen different types of high wing aircraft in commercial operation throughout the world.

Based upon wind tunnel research and development work by both Lockheed and NASA, we feel that the high wing, low floor, rear end loading configuration can have a drag level equal to or better than the best low wing configurations. Furthermore, this competitive drag level can be achieved without the necessity of a "broken tail."

NASA studies indicate that with proper

Precision Hi-Frequency Equipment for any POWER REQUIREMENT

At air installations and missile sites across the country and around the world, IDEAL Hi-Frequency Power Supply Units have demonstrated superior performance and dependability.

Custom-engineered to your individual requirements for high-cycle power, these units can be supplied for 400, 800, 1200 and 1600-cycle operation in stationary, portable, and mobile types with appropriate control equipment. Do you need engineering assistance? We will gladly help!

For Complete Details, Write for Bulletin 500



Above: 60 kva, 48 kw, 1200 rpm, 400-cycle portable unit for hanger, ramp and runway operation. Right: 25 kva, 20 kw, 1200 rpm, 400-cycle set with control supplied as packaged unit for stationary or portable use.



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World's Fastest Jetliner — holder of ocean-to-ocean transcontinental commercial airliner speed record... averaging 667 miles an hour.

Delta was first in the world to fly this unchallenged Champion of the Jets. Convair 880's, together with a fleet of magnificent DC-8's, are expanding Delta's pattern of jet service the length and breadth of its system. Cruising at 615 mph, the 880 out-distances all other jetliners while boasting the quietest cabin of any 4-engine jet. Delta's 880 is the most advanced airliner of our time.

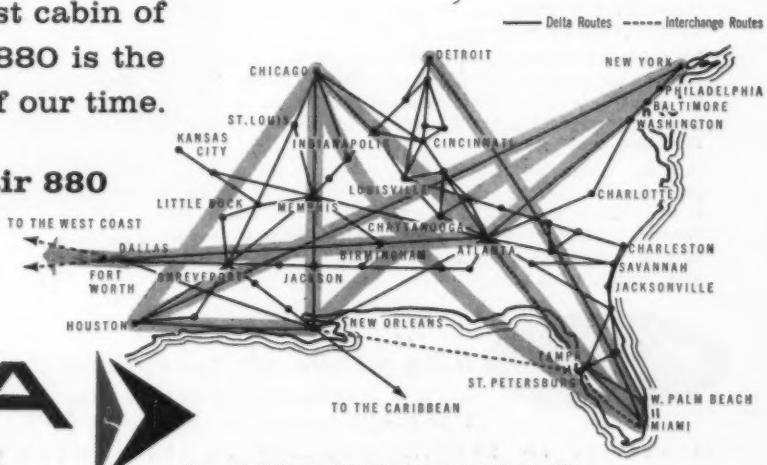
Delta DC-8 and Convair 880

Jet Service Routes

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LETTERS

wing-body fairing, there should be a negligible difference in parasite drag between a high and low wing configuration, and that the high wing configuration should supply a somewhat better span loading distribution with a corresponding reduction in induced drag. Furthermore, the interference drag resulting from the wing-body juncture is less than 5% of the total drag. Obviously, relatively large differences can occur in this portion of the drag build-up without greatly affecting the total drag.

As a result of analysis and wind tunnel testing of more than 10 different aft fuselage configurations, Lockheed has developed end loading and even air-drop capability with a drag level equivalent to

that for a minimum drag body of revolution. Consequently, we would not agree that the advantages of truck bed height end loading must come at the price of increased direct operating cost for the operators.

However, if one cannot accept the conclusion by NASA that there is no significant difference in drag between the high and low wing aircraft, then it can be shown from basic aerodynamic consideration that even if the high wing configuration had twice the wing-body interference drag of the low wing, the result would be an increase in direct operating cost of less than 1%. It seems absurd to conclude that a possible difference of less than 1% in operating cost is unacceptable

in view of the vast improvement in loadability.

F. N. DICKERMAN
Asst. Chief Engineer
Lockheed Aircraft Corp.
Marietta, Georgia

Plaudits for AIRLIFT

To the Editor:

I have read the May issue of *AIRLIFT* from cover to cover. The articles were not only interesting, but informative and will, I hope, assist me in a better understanding of trends in civil aviation.

ALAN S. BOYD
Member
Civil Aeronautics Board

When & Where

JUNE

- June 2—ATA, public affairs committee, conference room, Washington, D.C.
- June 3-4—Reading Aviation Service, 11th annual maintenance and operations meeting, Municipal Airport, Reading, Pa.
- June 5-10—Society of Automotive Engineers, national aeronautic meeting, Hotel Commodore, New York.
- June 6-10—ATA, agency committee, conference room, Washington, D.C.
- June 5-10—American Society of Mechanical Engineers, semi-annual meeting and aviation conference, Statler-Hilton, Dallas.
- June 7—IATA, executive committee, 47th meeting, Noordwijk, Holland.
- June 13-15—ATA, chief pilot's meeting, Claridge Hotel, Atlantic City, N.J.
- June 14-16—Aviation Distributors' and Manufacturer's Assn., Queen Elizabeth Hotel, Montreal.
- June 14-17—ATA, reservation procedures sub-committee, conference room, Washington, D.C.
- June 16-18—ATA, airline operations conference meeting, Claridge Hotel, Atlantic City, N.J.
- June 19-24—American Institute of Electrical Engineers, 1960 summer general meeting, Chalfont-Haddon Hall, Atlantic City, N.J.
- June 20-23—Advisory Group for Aeronautical Research and Development, avionics panel, Athens.
- June 25—Institute of Navigation, international jet airline transport day, U.S. Air Force Academy, Denver.
- June 27-30—Institute of Aeronautical Sciences, summer meeting, Ambassador Hotel, Los Angeles.
- June 28—ATA, board of directors, South American Room, Statler Hotel, Washington, D.C.

AUGUST

- Aug. 23-26—WESCON meeting, Ambassador Hotel & Memorial Sports Arena, Los Angeles.

SEPTEMBER

- Sept. 6-9—Farnborough SBAC Show.
- Sept. 12-16—Institute of Aeronautical Sciences, 2nd international congress, Zurich.
- Sept. 15-16—National Association of State Aviation Officials, annual meeting, Wort Hotel, Jackson, Wyoming.
- Sept. 20-22—National Business Aircraft Assn., annual meeting and forum, Ambassador Hotel, Los Angeles.

Correction

In May *AIRLIFT*, page 52: total cargo revenue, international, \$85,279,086 (\$562,476,370 shown is total operating revenue). Total cargo revenue, Panagra, should be \$2,662,279 instead of \$662,279. Ranking the World's Airlines, page 49: Air France, revenue passengers, 2,781,283; revenue passenger miles, 2,267,693,000. World Airline Statistics, page 50: Pan American, rev. pass. per employee, 146 instead of 3,740. Trunk Airline Statistics, page 83: Martin 4-0-4: Eastern, 56; TWA, 29; National, 0; United, 0. Note: where variations exist between numbers of passengers and passenger-miles (pages 50 and 66), larger figures reflect "all services" whereas smaller figures are for "scheduled" operations only.



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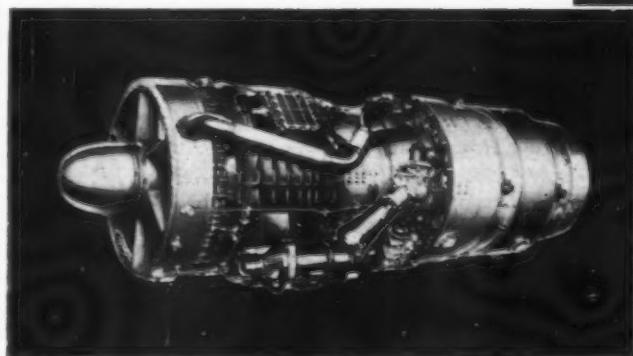
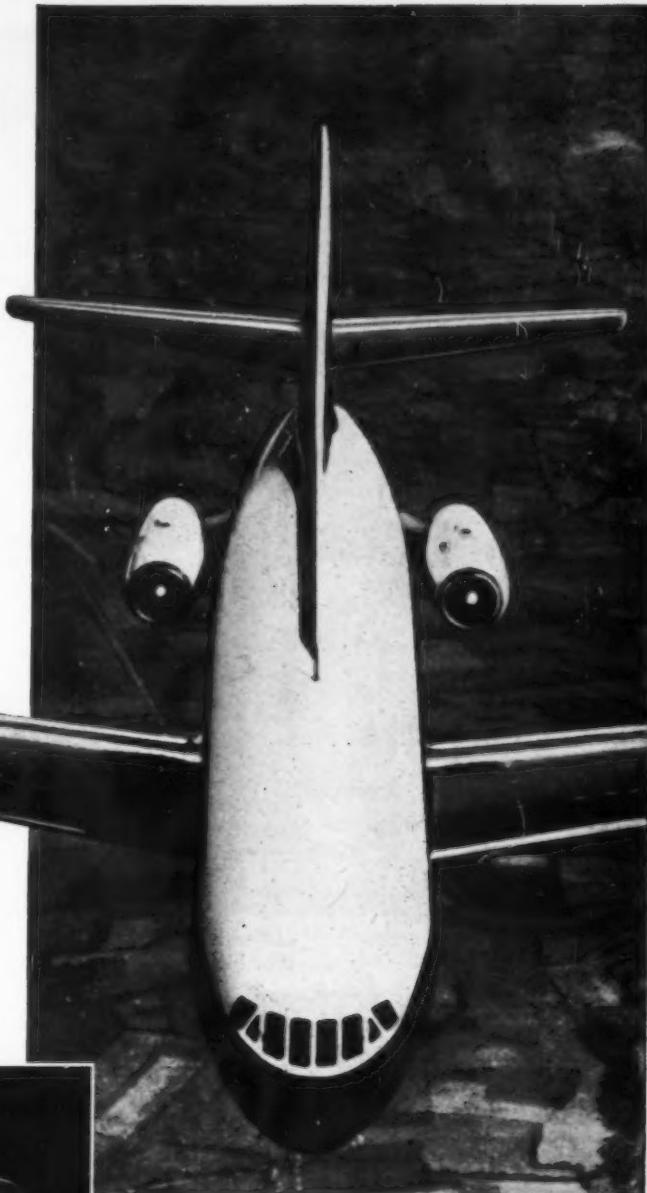
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JUNE, 1960

15

**Airfreight
On the Climb**

Air freight continues to show steady growth. Through mid-May, shipments were running 14.8% ahead of 1959, despite a slight April slump. Forecast for the year is a 16.75% increase. Some local service lines, incidentally, are objecting strenuously to trunks tapping their territories with combination air-motor service. Trunks maintain that such service is often faster and cheaper.

**Jet Training
Takes Its Toll**

There's a growing feeling among airlines' management that jet coach fares are too low. United already has asked CAB for an increase, maintains there isn't enough difference in service to justify the wide spread and that there's a substantial diversion of traffic from first-class. Some business firms are telling employees to use coach. And U.S. government urged workers to ride coach particularly on combination planes over short hauls.

Transition training continues to be the most critical safety hurdle into jet operations. Recent loss of Convair 880 on takeoff was the third such instance in 17 months of jet training, whereas record of carriers in scheduled operations is spotless. Watch for even greater emphasis on flight simulators to bridge the transition area. There's still a wide variation in airline philosophies toward simulators.

**Another Survey
On Baggage**

Million dollar cargo terminals at major stations throughout the world are planned by Pan American. A cargo planning group is now studying design, material handling, equipment, costs, etc.

**FAA Holds
Back the Jets**

Big airline headache—baggage that goes astray in transfers from one carrier to another—is to get attention. Air Traffic Conference will spend \$10,000, if ATA directors approve, to find ways to improve the system. Survey is planned in eight cities. Delivering bags that don't arrive with passengers is troublesome and expensive for carriers—and alienates customers.

Often-overlooked expense item that hits airlines: legal fees. Trunks, locals and internationals paid out more than \$3.9 million to lawyers last year. CAB cases take biggest bite.

**Improved Safety
Has a Pricetag**

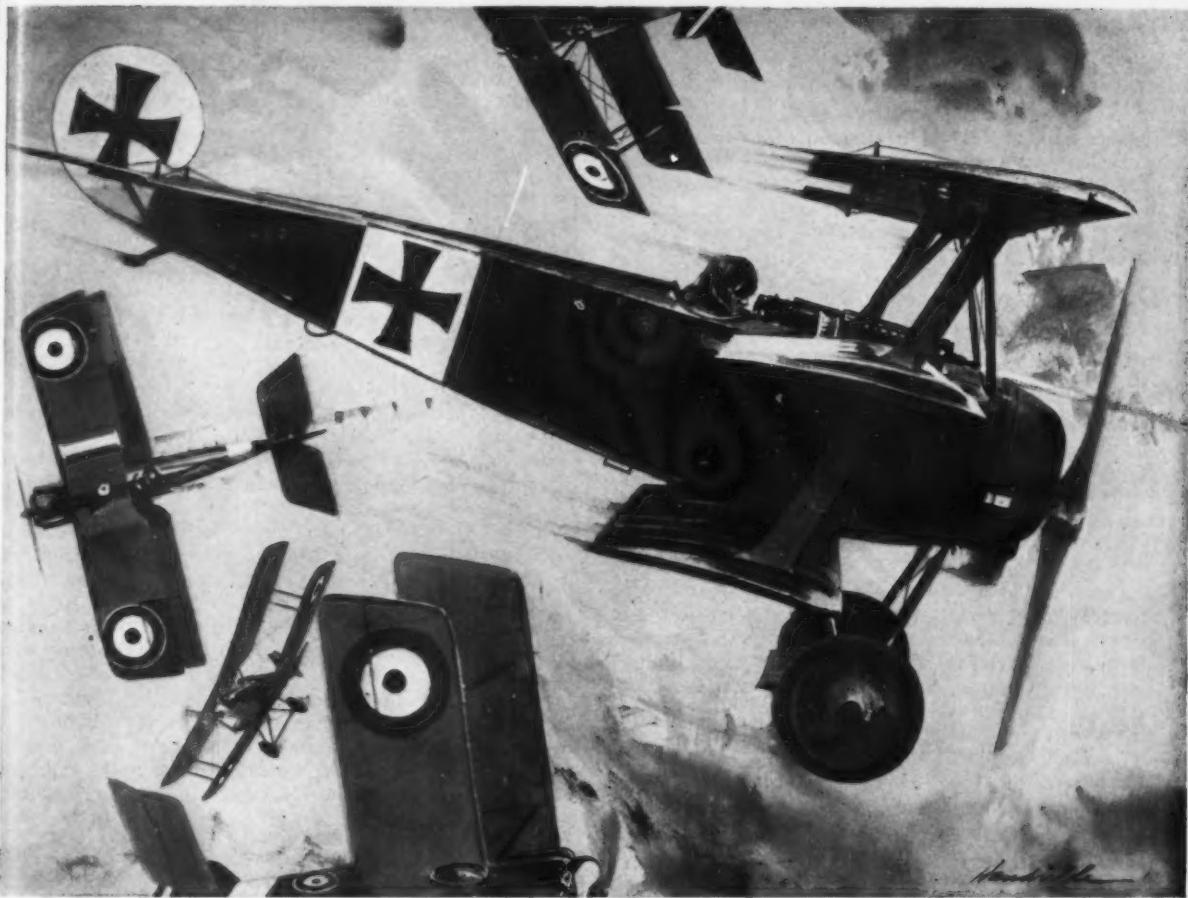
FAA moratorium on engine overhaul time extensions is namstring industry maintenance and overhaul planning. Despite marked increase in engine reliability with jets, FAA's bureaucratic attempts to apply statistical quality control to engine removal rates has more than one maintenance official concerned. Bill could run into millions of dollars unless trend is promptly corrected.

Management consultant services don't come cheap, especially when the assignment is to reorganize a big airline. Last year two major trunks paid \$509,019 to New York consultants—American \$256,786 to McKinsey & Co., and TWA \$252,233 to Cresap, McCormick & Paget.

New angle on air fares, and a good one: the charge by Harry F. Guggenheim, head of Cornell-Guggenheim Aviation Safety Center, that air safety is linked to the poor financial condition thrust upon carriers by CAB and Congress. Carriers as a whole simply aren't earning enough money to get the capital they must invest to maintain service, buy new equipment and utilize all safety devices, he says. Good recent examples of safety advances adopted voluntarily or forced on airlines, with major economic effects, are all-IFR flying, airborne weather radar, increased copilot training and flight recorders.

Shakeup among Eastern Air Lines' station managers in major cities stirred considerable comment. At least two managers with more than 20 years with the company were terminated; there have been numerous transfers. Station managers now come under customer services department, which is reorganizing company procedures on a broad scale. New department handles all ramp activities, except fueling and servicing—even has charge of aircraft cleaning because this is considered a customer service item.

For a 14" x 10" lithographic print, suitable for framing, write Aviation Division . . . Request Historical Series #3.



September, 1917 . . . Werner Voss in his Triplane takes on seven S.E. 5's.

Early War Birds—THE FOKKER TRIPLANE DR-I

In designing this German scout of World War I, Anthony Fokker was seeking climb and maneuverability. He achieved it to a remarkable degree. For his Triplane ranked with the Sopwith Camel as one of the supreme "dogfighters" of the War. Powered by a 110-h.p. Oberursel rotary engine, the Dr. I had a top speed of about 115 m.p.h. and an initial rate of climb of almost 2,000 feet per minute. The short span of its three wings made it unbelievably quick and agile.

The Fokker Triplane was associated with many notable German fliers, including von Richthofen; but few flew it so well or with such spectacular success as Lieutenant Werner Voss. In one three-week period he gained 23 victories with it. Voss' last encounter was an epic air engagement.

Late in the afternoon of September 23, 1917, he found himself in the midst of seven S.E. 5's being flown by

McCudden, Rhys-Davids and five other veterans of the British 56th Squadron. Without the least hesitation, he took on the seven opponents and started an engagement that was to last for 20 minutes. Early in the struggle he was aided by an Albatros Scout, but it soon fell out of control. Though hopelessly outnumbered, Voss continued on alone . . . never trying to break away. Through skillful flying, using maneuvers his adversaries had never seen before, he managed to avoid destruction, while he scored hits on every one of his assailants. Against less experienced pilots, Voss might have gotten away with it. But he was up against the best.

The end finally came as Rhys-Davids managed a clear shot at the elusive Triplane. Werner Voss, unbelievably brave and skillful, went down for his last landing. He had 48 accredited victories.



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NEWS HIGHLIGHTS

International Route Shakeup Coming?

The U.S. government is about to embark on the most comprehensive study of its international air routes ever made. Under a contract to United Research Corp. and at the direct instigation of the President, with approval of CAB and the State Dept., the route pattern of U.S. international air carriers will be thoroughly examined to see how it stacks up for the future.

Out of the study could come important route realignments. Significant is the fact that the President wants the report made to him in a matter of months, before settlement of the big Transpacific route case.

Bilateral Blowup

Debates were bitter, little was accomplished, and the U.S.-British air bilateral talks broke down after three weeks in Washington. The same thing happened at Barbados earlier this year. Whether another attempt will be made remains to be seen.

Britain's delegation, under heavy pressure from BEA and BOAC, refused to grant U.S. lines any kind of adequate traffic rights beyond London. Trying for the first time to relate traffic agreements to specific U.S. carriers, the British would okay Resort Airlines' Caribbean all-expense air cruises, and Aerovias Sud's cargo flights in that area. Pan American couldn't combine London and Paris on flights to and from the U.S. west coast, but TWA (which the British called "a low frequency operator") could. Because PAA this fall will be flying six weekly round-the-world schedules, the Tokyo-Hong Kong sector is reaching saturation, and Northwest would be allowed to serve Hong Kong only if it terminates there.

On the other hand, Britain wanted major concessions: a route beyond the west coast through Honolulu to Australia and New Zealand via Tahiti, rights at both Los Angeles and San Francisco, more U.S.-Caribbean routes. There was no agreement.

Also recessed without agreement were U.S.-Mexico talks. Principal reason: Mexico's insistence that U.S. lines be closely restricted on capacity.

Intrastate Surcharge

Trunklines weren't the only ones caught in the cost squeeze. Pacific Southwest Airlines, proud of its low fares and fast service, switched from DC-4s to Electras six months ago (*AIRLIFT*, December) with no fare increase. However, expenses started to catch up with the California intrastate operator. January-February loss was \$98,156 and PSA, which hauled almost 300,000 passengers last year, asked the state public utilities commission to approve a 90¢ surcharge on each one-way trip San Diego-Los Angeles and Los Angeles-San Francisco. New rates of \$6.50 and \$12.71 would still be under trunks' piston coach fares of \$6.50 and \$15.05.

Ads and Credit Cards: No Agreement

It was a family squabble at the Air Traffic Conference's closed-door spring meeting, but word leaked out that the hot subjects were advertising and the use of certain "outside" credit cards.

ATC's enforcement office had slapped fines on Braniff and Delta for certain Lockheed Electra ads, the former for using a picture in which propellers did not show, the latter for describing the plane as an "electra/JET." Both companies gave 90-day notice that they won't be bound by ATC's advertising resolution, and were joined by Frontier, which hadn't been cited for violations. ATC is now taking

a mail vote on a proposal to make part of the resolution not subject to enforcement. If amendment passes, the three lines may drop their withdrawals.

Trans-Texas, under investigation by the enforcement office for honoring American Express credit cards, gave notice that it will no longer be covered by ATC rulings in this field. ATC lawyers had ruled that use of Amexco cards was a violation because Amexco is a travel agent and can receive only a commission, whereas companies that honor the card also pay a 2% fee. TTA's position: if cards are used on-line only and ticketing is through TTA offices only, ATC has no jurisdiction.

CAB Loses Two

CAB is the loser in two more court cases. U.S. Supreme Court upheld an appeals court decision which reversed award to TWA of a St. Louis-Florida route. Other carriers had protested that the award gave TWA a one-stop Miami-Los Angeles southern transcontinental. Also, the U.S. Court of Appeals remanded the New York-San Francisco case, in which American got nonstop rights, to the Board to hold hearings to determine if improper influence was brought to bear on the agency.

In the Florida case, CAB, following the court action, gave TWA temporary authority to continue operations (west coast-Florida passengers must change planes at St. Louis) until it can act. TWA wants a re-issued certificate with a long-haul restriction. Delta and Eastern are fighting the application. In the San Francisco case, CAB some months ago, after oral argument, cleared American of improper influence charges made by TWA and United. But the court, which did not upset the AA route award, said more hearings should be held.

Newest Jet and a Setback

April 30 was a big day for Delta Air Lines and its president C. E. Woolman. Not only did it mark Woolman's 35th anniversary, but FAA chose the date to stamp its approval on his prize jet, the Convair 880, the best evidence yet of his long climb from cotton dusting.

Two weeks later, on May 15, the sleek 880 registered three other firsts as Delta inaugurated service. To Delta came the distinction of being the first airline to introduce two new jets (it beat United by hours last September with DC-8s). For Convair, it was its first scheduled jet flight and for General Electric, the first time a GE jet has powered a commercial transport. That day the 880 logged an 85% load factor in all first-class nonstop service between New York and Atlanta (1 hr. 41 mins.), New Orleans (2 hrs. 9 mins.) and Houston (2 hrs. 41 mins.).

On May 23, a four-man Delta training crew, taking off from Atlanta, was lost in the first 880 accident. A temporary setback? Perhaps, but doubtfully. Before the incident the 880 had proved itself by easing through FAA's certification program without a hitch, accumulating more than 1,200 hrs. over a 15-month period.

New Deadline for Capital

Developments in Capital Airlines' critical situation (see page 25) were coming fast. At presstime the airline was granted a delay by Vickers of the foreclosure deadline until June 6, and asked CAB's okay to withdraw its subsidy application.

Two reasons for withdrawing: (1) CAB said it will entertain fare increases and this could mean \$7 million more a year for Capital, (2) the "threat of dismemberment" in CAB's investigation order was hampering the line's efforts to raise money.

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NEWS HIGHLIGHTS

Fairchild Offers Military F-27

Working hard for new F-27 markets, Fairchild Engine & Airplane Corp. offered several military versions of its twin-engined turboprop to the Defense Dept.

Now available is the M-258G, an F-27 with side-loading cargo doors, pressurized cabin and cargo space, powered by Rolls-Royce Dart 8 engines. Also offered is the M-258H, the same plane but with STOL capability acquired by addition of double-slotted wing flaps and variable incidence stabilizer. An M-258J would have STOL but is unpressurized and has rear end loading. The ultimate: a rear-loading M-258K powered by GE T-64-8 engines.

Maximum gross for military versions is 38,500 lbs. with payloads up to five and six tons. Typical example of data for STOL version: 34,000 lbs. gross takeoff weight, 6,000 lbs. payload, 250 nautical mile range, ground roll 560 ft. Price for Rolls-Royce model: \$800,000 to \$1 million each, depending on quantity; GE model slightly higher.

Monroney Talks Back

It isn't often the powerful railroad lobby gets blasted in the Senate, but Sen. A. S. Mike Monroney (D.-Okla.) told the surface lines off good for their efforts to scuttle the airlift of first-class mail. The rails, said the chairman of the Aviation Subcommittee, have let loose an "unbelievable barrage" of information about the program. The facts, he added, are: airlines get about \$3 million a year from first-class mail and planned increases will up this \$1.5 million to \$2 million. Rails receive \$345 million from the Post Office and will get more in the coming year, even after the diversion. He pointedly reminded the rails that they brought it on themselves: 1,700 mail-carrying passenger trains have been withdrawn since 1953.

Rheinstrom's Settlement

Last November, when American Airlines launched its systemwide reorganization, the industry buzzed over resignation of executive v.p. Charles Rheinstrom, who had rejoined the company (previously with AA 1928-46) only 18 months earlier as No. 2 man.

Recently, terms of the AA-Rheinstrom settlement agreement were revealed: AA pays his salary (\$60,516 in 1959) until Mar. 31, 1961, then pays \$1,250 a month until Nov. 30, 1962. Rheinstrom, now back with J. Walter Thompson ad agency, agrees to perform part-time consulting services, not to work for competitors without AA's okay. At age 65 (he's now 58), he's entitled to annual pension under the retirement benefit plan of \$12,091.

BAO's Package Deal

In a route case, CAB members and examiners supposedly give no more weight to evidence submitted by their own Bureau of Air Operations than to that of any other party. Nevertheless, BAO's views are of considerable interest to applicants, especially in a matter as important as the big Transpacific case.

In an unusual move, BAO came up with a "package" deal, to be accepted in full or rejected entirely. Said its brief: Pan American's Pacific authority should be extended to New York to give it an edge over foreign competitors. If this is done, Northwest should get the mid-Pacific route from Los Angeles/San Francisco to Hawaii, to preserve the goal of "balanced competition." But if PAA is rejected, Western instead of NWA should have the mid-Pacific.

Other recommendations: renew South Pacific's Hawaii-Tahiti permit for five years, but no extension to the main-

land; allow United to overfly California on Hawaii flights; all-cargo service is not needed in the Pacific.

Briefs

Allison-powered Convair 440 turboprop was certificated by FAA. Maximum takeoff weight is 53,200 lbs. at minimum field length of 4,180 ft. Maximum landing weight, 50,670 lbs.

Allegheny Airlines will lease 23 AVQ-50 airborne weather radar units from RCA. The manufacturer is also offering for lease other electronic devices.

Loan guaranty of \$469,000 was approved by CAB for Pacific Air Lines, covering purchase of three Martin 404s, engines and spares. New York Airways has applied for a \$3.8 million guaranty for five Vertol V-107 helicopters.

United Air Lines will operate the Caravelle as an all first-class plane (62 seats), doesn't plan to fly it into either LaGuardia or Chicago-Midway. UAL has a working arrangement with Sud Aviation under which the latter will help it dispose of piston planes.

Continental Air Lines added two Boeing 707 flights on its Chicago-Los Angeles route, increasing utilization of each of its five jets to 12 hrs. 45 mins. daily. Company is operating eight daily round trips.

Jet equipment purchases: United Air Lines signed a contract with Consolidated Systems Corp. for more than \$250,000 worth of airborne vibration monitoring systems. General Electric received an order from Convair for more than 100 silicon dc power supplies for use in Convair 880 and 600 jets.

Scrip books for airport limousine trips and taxi rides are being given a six-month test in a number of cities by Airline Ground Transportation Assn. The test, using \$15 books in denominations of \$1, 50¢, 25¢ and 10¢, was launched in South Bend, Ind., and will expand to other cities later.

Australian air fares may increase 7½%. TAA and Ansett-ANA are considering a boost to cover mounting costs.

Melvin H. Nuss, manager of Reading, Pa., Municipal Airport (Gen. Spaatz Field) for 21 years, resigned and is devoting his time to his insurance business. Nuss, well known in aviation circles, reportedly left because of differences of opinion with city administration.

Five to seven Convairs a year will be added to North Central's fleet for the next several years. Conversion to turboprops won't start for three or four years.

New On The Order Books

SALES: Northwest Airlines: Will order 15 medium-range jets from Boeing or Convair within 90 days. Initial order will probably be for six at cost of \$25 million, deliveries starting in second or third quarters of 1961. **Lake Central:** will buy five Convair 340s from United for conversion to Allison turboprops.

Trans-Canada: announced intention to buy three more Vickers Vanguard turboprops for delivery in early 1962. Company now has 20 on order, first of which is in preflight status. **Vickers:** sold three Viscount 810s to All-Nippon Airways and three to Ghana government for use by Ghana Airways. Also sold a sixth Viscount to VASP, Brazilian line. Total Viscount sales are now 423. **Fokker:** sold two additional F-27s to Pakistan International Airlines, which also optioned three more. New Zealand National Airways ordered four more and optioned three. These re-orders bring Fokker's F-27 sales to 79. Including Fairchild-produced planes, total is 162.

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JUNE

Merger Rumors Run Rampant

Quest for cure to financial ills
spurs speculation on potential
alliances—most of it groundless

ANNOUNCEMENT of merger plans by TWA and Northeast gave impetus to an already burgeoning rumor market about mergers among trunk carriers.

Merger talk is at a new high, sparked in part by admissions by major carrier presidents that they were interested in mergers and by others who flatly predicted that the present 12 trunks would have to be reshuffled into a new system of anywhere from six to 10 carriers.

Much of the talk was pure speculation. Some of it had no basis whatever in fact. But there was ample evidence in May that some major moves to realign the trunk system were in the works. Attention focuses on CAB and whether it will act in a way that will encourage mergers.

There was also evidence that some sharp outside financial investors out to make a fast buck were moving into a few situations in order to promote and bring about a merger or two—and clean up in the doing.

Some carriers were upset about the rumors. Delta, for example, insists it is not in any way involved in merger discussions or plans, even indirectly. Yet the rumors had Delta merging with American, United, or taking a piece of Capital, or what have you. As far as Delta is concerned, there is no evidence of activity.

But the TWA-NEA proposal couldn't help but spur American on its long-range plans to seek an entry to Miami, by one means or another. And now that one proposal has about taken tangible form, there are other moves that could well be made before the end of the year in other areas of the country.

CAB decisions in two big cases—the Southern Transcontinental and Transpacific—may touch off activity. These cases—decisions not expected before late in the year—may be the last chance for some lines to expand. If CAB doesn't give them routes, they may turn to merger.

The TWA-NEA case will test CAB's merger policy. A quick okay with few strings attached will pave the way

for other consolidations involving carriers who may find it hard to survive in the day of big jets and multiple competition. A turndown, or a long drawn-out case (average time for a merger decision in the past: 11 months) will put a roadblock in the way of further moves.

Only recent hint of Board thinking came from member Alan Boyd. His comment: CAB has a "respectable" record in handling mergers when other airlines haven't intervened. Due process must be served and this principle is "more important than any merger of airlines." His suggestion: merger cases could be speeded if intervenors would show "restraint."

Contributing to the upsurge of merger activity was the fact that some predictions of the past several months were coming true. Load factors were down, expenses up (first quarter domestic loss: \$13.5 million). It was dog-eat-dog on routes with three and four carriers. And with the full jet pattern not yet established, competition hasn't reached its peak.

"With the right number of competing . . . trunklines, there is enough total business to reasonably assure a profit for each efficient operator," said American Airlines president C. R. Smith.

His proposed policy: (1) encouragement of mergers that will remedy inefficiencies in route structure through redistribution of competition, or reduction of excessive competition, (2) encouragement of mergers that will accomplish economies; (3) repeal of subsidy sections of the Federal Aviation Act for all trunks.

From the important financial community came a blunt statement by Albert Gordon, of Kidder, Peabody & Co.: "The airline system . . . is in need of major overhaul . . . The concept of multiplicity of competition in many markets over the same routes has been a failure . . . Route realignments, suspensions, mergers and consolidations are essential . . ."

TWA-NORTHEAST

Talks between Atlas Corp. and Hughes Tool Co. resulted in (1) a TWA-Northeast merger proposal, (2) separate agreement with General Dynamics for NEA to lease (with option to buy) six of the 30 Convair 880 jets ordered by Hughes for TWA. In connection with the lease, Hughes will provide NEA with \$9.5 million in new funds.

Merger would be on the basis of exchange of one-third share of TWA common stock for each one share of NEA. Directors of NEA approved the deal; TWA's board is considering it. CAB and SEC approval are needed.

TWA (\$262.1 million assets) is 78% owned by Hughes Tool, flies domestically (70 cities) and internationally (23 cities). Only route duplications with NEA: Boston-New York, Washington-New York, Tampa-Miami. TWA's 1959 net: \$9.4 million.

NEA (\$35.5 million assets) serves 38 stops, is 55.8% owned by Atlas. Its temporary New York-Miami certificate expires in late 1961. Last year's net loss: \$7,162,931.

MERGER DETAILS

Merger would, for the first time, put a transcontinental line on the New York-Florida route.

NEA's big losses imposed a cash drain on Atlas. The line's deficit at the end of 1959 was \$14,224,915. After announcement of the merger and lease of 880s, Floyd B. Odlum retired as Atlas chairman, cited the NEA problem as one reason he had stayed longer than he had intended. David A. Stretch will be president and chief executive officer, also continue as NEA board chairman.

Hughes Tool's \$9.5 million will be used by NEA for working capital, spare parts, jet integration. This deal and the 880 lease are *not* conditioned on merger. Hughes' funds will be represented by convertible notes subordinated to NEA's existing equipment debt. They cannot be converted into stock unless CAB approves. In event of merger, the notes will be converted into NEA common prior to effective date of merger and will become additional stock of the merged company owned by Hughes Tool.

GPFI Opens Door to Fare Hikes

THE DOOR IS OPEN for a trunkline fare increase about July 1. How much it will be remains to be seen. Confusion still reigns.

For the first time, CAB has set a profit standard for non-subsidized airlines. Industry will be allowed more reasonable profits. It's no longer bound by old public utility rate standards.

Management will have much more flexibility in pricing its product. There'll be more investor confidence.

These are the significant results—immediate and long-range—of CAB's four-year-old General Passenger Fare Investigation. A press release announced that the Board, while still ironing out details of the case, has decided to permit the trunks average earnings of about 10.5% on investment "over an extended period."

This isn't a profit guarantee. If trunks can earn that much profit, it will be okay with CAB. If fare boosts are needed to produce that much profit, CAB will approve. But, if earnings top 10.5% for an extended period, cuts will be ordered.

If the new standard had been in effect in 1959, trunks might have earned one-third more profit—about \$20 million. Last year's net after taxes was \$59.9 million, or 7.2% on invested capital. Not since 1955 has the trunks' return been as high as the new CAB standard. For the entire postwar period it has been about 7.5%.

Never before has there been a profit standard for self-sufficient airlines. The yardstick used in the past was that developed in the early days by CAB in subsidy cases. Much reliance was placed on old public utility rate decisions. For domestic lines, CAB usually observed a 7% profit return. After most trunks went off subsidy in 1951, the 7% remained as the measure of "reasonable earnings."

Another yardstick needed

Although it has generally been lost sight of, GPFI started in 1956 in an atmosphere pointing to enforced fare cuts—profits had been over 7%. However, the jet age was coming and it became clear that airlines, for numerous reasons, needed a profit yardstick peculiar to their own needs.

CAB examiner Ralph Wiser, who conducted GPFI, said in his initial decision:

"The domestic . . . industry is in a general risk position far above that of utilities such as electric, gas, water and telephone utilities. This is shown by practically all measures and ratios which indicate risk, such as instability of earnings, dividends and common stock prices. Accordingly, it is apparent that a profit allowance substantially above those allowed in these industries will be required."

Thus, CAB's new announcement is historic, because it means: CAB for the first time has torn itself away from concepts borrowed from ancient public utility rate cases.

The industry has been recognized as a unique utility in its continuing need for private capital and its need for earnings to attract capital.

Investors who shied away because of restricted earnings will look with new respect at airline shares.

In the long run, these things transcend the popular issue of the day, namely, whether fare increases will be allowed and, if so, how much. Nevertheless, there is an importance to the fare questions which can't be overlooked.

Confusion now reigns in the fare field. CAB's release didn't say what increase might accomplish the profit jump. The only statement the agency made was: "The current fare level is embraced in temporary tariffs . . . due to expire

June 30, 1960, and in considering future fare proposals the Board will employ the regulatory standards which it has voted in the general investigation."

This, of course, would indicate that higher fares would be permitted. However, profits of individual carriers vary and the fare increase that might raise one company up to CAB's 10.5% standard wouldn't necessarily do the same for any other.

Also, airlines can't jointly discuss fare proposals—it's contrary to anti-trust laws. CAB can exempt the carriers from these laws, but so far it has not done so.

Only alternative has been for each line to file its own proposal. They have varied all over the lot.

Since airlines stay strictly competitive on fares, it is obvious that numerous adjustments will be necessary in the original fare proposals. Assuming that the hit-and-miss tariff filings eventually result in a uniform industry increase, it is then up to CAB to pass on it in line with the new profit standard.

What increase might result remains to be seen. A year ago, Wiser suggested a 2% boost would get profits up to a reasonable level. His profit yardstick of 10.6% was almost identical with that just announced by the Board. During the course of the GPFI, fares have risen about 10%. Whatever proposal results from the current situation will be in addition to that 10%, unless there is a surprising CAB ruling to the contrary.

In any event, the door appears open for a boost about July 1. There is some likelihood that a new earnings yardstick will be forthcoming for local service lines, and fare increases for that industry may be expected, at least in some markets.

After the present confusion has been erased, the full effect of the new trunk standard will be subject to greater recognition. For example, prompt government action on future fare revisions can be expected because CAB will have a yardstick with which to measure the changes.

There should be fewer tariff suspensions and, accordingly, a decline in lengthy and expensive fare investigations. More important, management will be able to adjust more rapidly to changing economic conditions.

There is a big additional benefit. This will stem from the absence of the GPFI, once it is concluded. For four years, the case has hung over the industry's head like a dark cloud. The financial world was skeptical of an airline seeking funds for jets because it knew the company's future was in doubt while the GPFI remained unresolved.

Now the case is not only in the final stages but is apparently ending on an encouraging note—immediate fare relief, and a realistic federal approach to future airline problems.

What They Want in New Fares

Flooded with a variety of proposals for fare increases, CAB called a halt in late May. It suspended tariff filings, said that after final decision in the General Passenger Fare Investigation was issued it will study the proposals of all carriers and decide what tariffs will be allowed to become effective. Here's what airlines had asked (some carriers noted exceptions under certain circumstances):

American:	4% plus \$1 per ticket	Continental:	6%
United:	4% plus \$1	Western:	4% plus \$1
Eastern:	5% plus \$1	National:	5% plus \$1
TWA:	10%	Northeast:	5% plus \$2
Delta:	\$1 per ticket	Northwest:	4% plus \$1
Capital:	5% plus \$1	Braniff:	3%

Dismal 1st Quarter: \$13.5-Million Loss

IF THE CIVIL AERONAUTICS Board needed any further reasons why fast action is needed on fare increases, it got them—with some to spare—in 1960's dismal first quarter.

Mounting expenses ran away from trunkline revenues which were held down by a combination of traffic-stunting developments.

Result: A \$13,490,566 net loss on domestic operations—a spread of \$22 million from 1959's first quarter when the 12 trunks showed \$7.7 million net profit. Operating loss was \$21.7 million against income of \$16.8 million last year.

In the second quarter, business has picked up, but still there is only cautious optimism. The amount of transportation being offered for sale continues its fast rise. Whether actual sales will keep pace is the question.

Here's what happened—and why—in the first quarter: Passenger-miles increased 8.6% from 1959. But available seat-miles, swelled by the jets, jumped 13.3%. Operating revenues gained 10.3%, but expenses were up 21%.

Bad weather, accidents, Electra restrictions and bomb hoaxes combined to hold down traffic. Also, Easter, which is said to account for about 2% of a month's traffic, came in April instead of March.

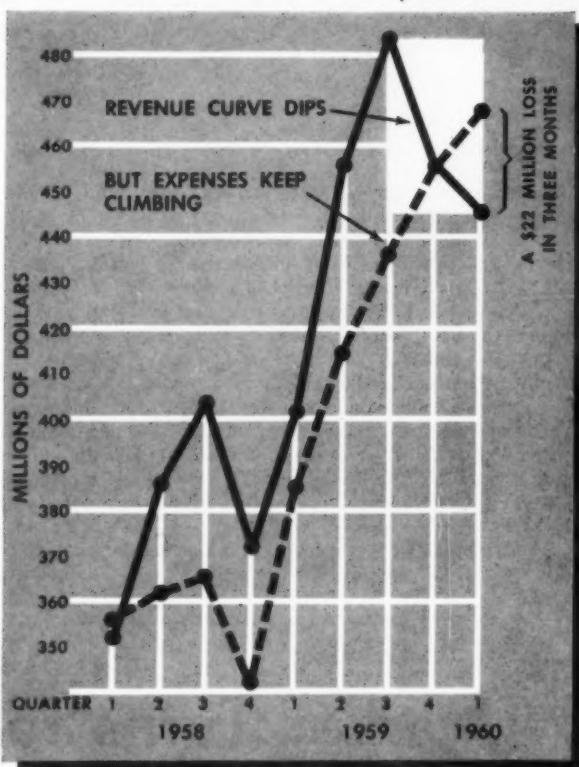
First-quarter revenues—although up from the same period a year ago—were below 1959's fourth quarter, instead of showing the usual upswing. And while the revenue line dropped, the expense line crossed it on the way up (see chart).

Cost per available ton-mile showed an unusual 5% increase. Principal reasons: A big jump in depreciation, insurance, and jet pre-operating costs, some of which were expensed. Interest payments were up more than \$2 million.

End result was that break-even load factors climbed, actual load factors dropped.

Five of the trunks—Continental, Delta, Eastern, National (aided by tax accounting adjustments) and Western—showed first quarter profits. But seven were in the red—American, Braniff, Capital, Northeast, Northwest, TWA and United. Biggest net losses: Capital, \$5.4 million; TWA, \$5.3 million.

April marked an upturn. Passenger-miles increased 10.8% over 1959, while available seat-miles gained only



9.7%. Load factor was up .6%—the first time in seven months that it has been higher than the same period a year ago. Compared with March, the April load factor was up 5.48 points, from 55.75% to 61.23%.

However, many observers, refusing to make optimistic predictions, preferred to wait and see what the second quarter produces. There promised to be a substantial improvement over the first three months, but would it be good enough to catch up with still-rising expenses?

Neelands on Top in Capital Shakeup

FROM WHAT SEEMS the darkest financial hour yet to face a U.S. scheduled airline, Capital Airlines is making a do-or-die fight for escape from foreclosure, bankruptcy, dismemberment and a host of other misfortunes predicted for it in recent days.

Not that the worst is over. It still has some mighty big hurdles to top. But the forces backing president David H. Baker have executed a sweeping reorganization of the board of directors, the executive committee and top level management in an attempt to pull the airline from its financial quagmire.

After 28 days without a chairman for its board of directors, influential moneyman and former Capital director

Thomas D. Neelands, Jr. was elected to the chairmanship.

Simultaneously, the influence of much-publicized lawyer, director and big stockholder Charles H. Murchison (who only a month ago almost took over Capital's reins) dipped to a new low. Murchison personally was dropped from the executive committee and his law firm of Adair, Ulmer, Murchison, Kent & Ashby, which last year collected \$178,718 in legal fees, lost its account.

In a sweep of top management, Baker asked for and received the resignation of James B. Franklin as sr. v.p. operations. Franklin, ex-Capital pilot who moved up to head operations in '48, returns to flight status. His assignment is taken over by Marvin Whitlock as sr. v.p. operations &

**Big names in the news at Capital:
new chairman, biggest loser and
the man who wants more changes**



NEELANDS
New Boss



MURCHISON
Loses Fight



BEATLEY
Wants Action

maintenance and R. W. Hardesty, v.p. flight and ground operations under Whitlock.

John Mahoney becomes v.p.-corporate affairs; Hayes Dever, v.p. public relations and secretary; Read Chalfant, v.p. and asst. to Baker; John B. Andersen, asst. v.p. sales.

On the surface, it appeared that the sweeping changes both in the board of directors and management represented a drive by Baker & Co. to weld a wide split which has paralyzed top-level policymaking at Capital for some time.

The move came none too soon with a May 27 date of Vickers foreclosure action (expected to be extended at least 30 days), a CAB prehearing conference on subsidy and an even more searching query by CAB into Capital's management efficiency descending upon the airline in quick succession.

Now the Baker forces have one remaining problem to deal with—an employe-dominated Capital Shareholders

Assn., formed by pilots of the airline last August but which has boomed in membership almost overnight from 300 to about 2,500.

Headed by Capt. Charles Beatley and boasting 75% of Capital's field employees as members (plus many headquarters supervisors), the group has filed with SEC for an OK to solicit proxies to call a special stockholders meeting. The goal—to completely overhaul the board of directors, put some new, strong financial men in more than a scant majority (7) of its 13 seats.

Pilot Beatley pulls no punches in his criticism of what the past split on the board has cost Capital or in his criticism of the management of the airline under Baker. When apprised of the revamped management, he indicated he saw nothing in it that would slow the efforts of the Shareholders' group to carry out its re-management drive.

Market Turns to Short Range Jets

THE SECOND OF THE major transport buying sprees is about to break. Matching in numbers, although probably not in dollars, the 1955 landslide of orders that brought the 707, DC-8 and 880 into existence, the market has shifted to the short medium jet.

The model numbers have changed, but the key contenders remain the same—Boeing, Douglas and Convair. Here's how their competitive projects shape up:

Boeing—Virtually conceded an order from Eastern Air Lines for 40 three-engine 727s, principally on the strength that EAL's v.p.-engineering Charles Froesch has been the industry's strongest advocate of three engines. United Airlines, although not insisting on a trio of engines, apparently doesn't object either and its president, W. A. Patterson, has openly indicated interest in 40 727s if and when Boeing decides to build it. An 80-plane start would give Boeing a market edge that would be hard to overtake.

Douglas—Faces its big sales test since signing the Caravelle pact, and has the edge in earlier delivery schedules for present Caravelles, and the promise of an advanced Caravelle demonstrator (with GE engines) to be available later this year. With the competitive threat of United's Caravelle inauguration in August 1961 expected to spur some interim buying of Caravelle VIIs, Douglas pegs its future in the competition on the Models VIII and XIV. Here it is pitting twin-engine economy against the tri-engine 727 and the Caravelle's tail-mounted engines against the wing podded Convair Model 60.

Convair—Sporting a short-body version of the 880 (with five fewer seat rows) and two wing-pod mounted jets, Convair is selling early delivery and greater parts interchangeability (with 880s and 600s) against its Santa Monica

and Seattle competition to land an order from either American, TWA or both. To meet Convair's needs, both General Electric and Pratt & Whitney have responded with 20,000 lb. thrust versions of their fan engines, designated the CJ805-41 and JT3D-5, respectively. P&W estimates 5 availability 24 months after an order, a good indication that the Model 60 buying would have to take place soon.

The market for the smaller jets looks good. At least two of the three contenders put it between 500 and 800. Sud Aviation's chairman Georges Hérelle pegs that of the Caravelle alone at 500—100 in Europe, 300 in the U.S. and another 100 around the world. Boeing's V.P. engineering E. C. Wells figures higher—800 for all small/medium jets but his estimate includes such bigger models as Boeing's present 720 and the Convair 880.

Specs on the New Jets

	Boeing 727	Convair 60	Caravelle	
			VIII	XIV
Takeoff Gross Wt.	128-136,000	145,000	110,000	115,000
Max. Cruise (Mach) ...	.84	.82	.77	.85
Takeoff Distance ...	5,000 ft.	5,000 ft.	6,500 ft.	6,500 ft.
Seats *	72	68	68	.....
Engines	**AR963-6 (3)	CJ805-41C JT3D-5 (2)	RB-141-11A CJ805-23	Same as Mark III
Payload Range	1,500 mi.	1,200 mi.	1,200 mi.	1,200 mi.
Availability ..	Mid-'63	Mid-'62	Spring-'62	Spring-'63

* Four abreast, 1st class. ** Allison-built, Rolls-Royce.
Note: Model 60 will have 140,000 lb. max. landing weight, zero fuel weight of 102,000 lbs., 880 wing of 2,000 sq. ft. and the Model 600 tail configuration.

De Havilland Aims DHC-4 at Feeders

Short, steep landings, ground runs of 500 ft. on rough strips characterize this rugged transport



Caribou demonstrates its attractive takeoff characteristics from unimproved strips during recent tour in Australia.

DE HAVILLAND AIRCRAFT of Canada, its piston-powered STOL Caribou now firm in the inventory of the U.S. Army to the tune of 27 aircraft, has shifted its sights to the feeder airline potential of the high-wing transport.

Close on the heels of a three-month demonstration tour that took a commercially-fitted DHC-4 from Hatfield, England to Australia and back, sales demonstrators have been directed into the Scandinavian countries abroad and to the local airline markets of western Canada.

On de Havilland's future agenda is South America with stops in the U.S. on the way.

The Canadian aircraft builder is putting its money on

the Caribou, not in the high-density, heavily-populated areas that dominate many of the U.S. local routes, but rather in remote feeder services: in other words, wherever performance versatility is in demand. Rough, shortfield landings at full load; good or bad airports; bush country; sometimes hacked-out jungle strips.

Not only do such operations demand the ability to meet such Jekyl and Hyde-like operating situations but they often call for similar fast changes from passengers to cargo or perhaps a combination of both.

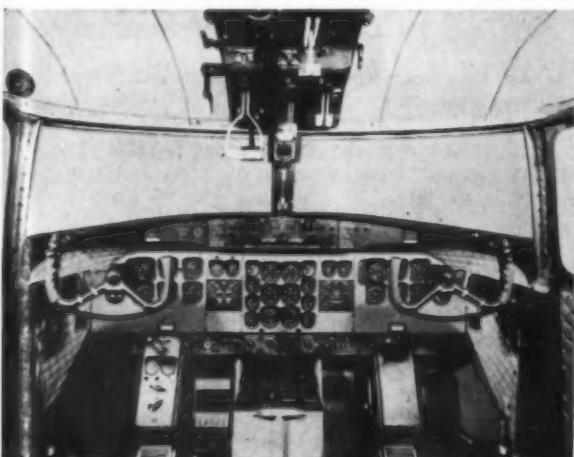
The DHC-4 Caribou, unveiled in 1958, was the outgrowth of de Havilland Canada's success in meeting these market demands on a smaller scale with its 7-place, $\frac{1}{2}$ -ton payload Beaver (1947) and later its one-ton payload Otter (1951). But the jump to the Caribou was much bigger, six times the payload of the Beaver.

As a commercial transport, de Havilland proposes the DHC-4 as a 26-passenger design complete with lavatories, a buffet and baggage compartments. Its stage distance at full load is 200 miles and fuel consumption over this distance is 0.2708 lbs. per mile. Travel time: 1:15 hrs.

A utility version would accommodate 30 passengers in seats that could be folded against the wall if cabin area is needed for cargo. As a freighter, the Caribou would haul 6,400 lbs. over 200 miles (VFR) and 3,000 lbs. for 1,000 miles. For instrument operations (IFR), respective payloads would be 5,200 and 2,400 lbs.

The Caribou structure, particularly landing gear, is designed for short, steep landings, often with ground runs of less than 500 feet on rough strips. The 1,000 cu. ft. cabin is adaptable to a wide variety of loading arrangements. A rear loading door measures 73.5 x 75 in. for rapid cargo handling. The floor is stressed for 200 lbs./sq. in.

Most of the Caribou's service experience to date has been accrued by the U.S. Army. After delivery of five aircraft and following extensive evaluation trials, the Army



Cockpit of the Caribou. Radio console can be stowed when not in use.

placed a follow-on order with de Havilland for 22 more, designating it the AC-1. Its military use for rapid battlefield mobility of both men and materials is an endorsement in a type of operation that virtually parallels the remoted area local airline.

In matching the Caribou to commercial operations, de Havilland has come up with this cost analysis for both VFR (visual flight rules) and IFR (instrument) flying:

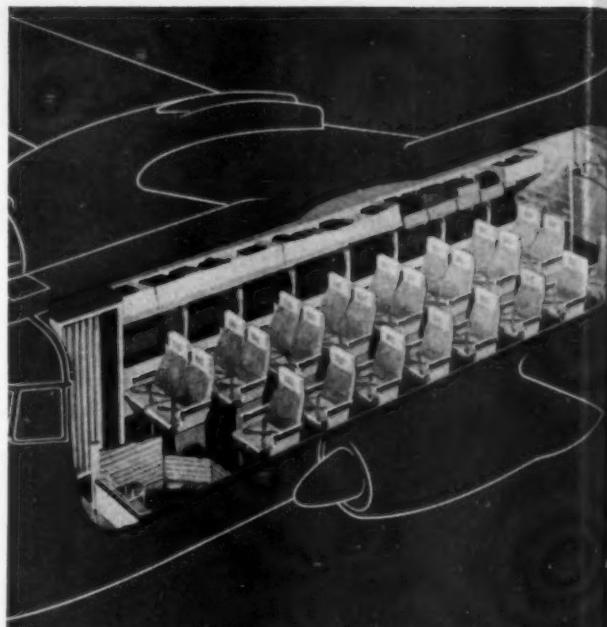
VFR Utility Version

	Stage Distance			
(2,000 hr. annual utilization)	100	200	400	600
Block speed	147	163	172.2	175.4
No. of Passengers	30	30	29	25
Fuel & Oil (\$/hr.)	\$ 43.80	\$ 39.85	\$ 37.34	\$ 36.30
Total Operating Cost				
Per flight hour	\$124.78	\$120.83	\$118.32	\$117.28
Per plane-mile	0.85	0.74	0.69	0.67
Per ton-mile	0.249	0.23	0.241	0.27
Per pass.-mile (#)	2.83	2.47	2.37	2.68

IFR Utility Version (Using 3,000 hr. utilization)

Cost per flight hour	\$111.73	\$107.78	\$105.27	\$104.23
Per plane-mile	0.76	0.66	0.63	0.59
Per ton-mile	0.223	0.205	0.215	0.24
Per pass.-mile (#)	2.54	2.20	2.11	2.38

Notes: Stage distance, block speed, no. of passengers and fuel/oil as noted in VFR table. Cost estimates per 1955 ATA formula.



Cabin layout of an airline version of the DHC-4. Interior includes provision for buffet.

Specs on the Caribou

Gross T.O./Landing Wt.	26,000 lbs.	Fuselage length	72.6 ft.
Empty weight	16,850	Wingspan	96 ft.
Cruise speed—sea level 7,500 ft.	170 mph	Height (fin)	31.8 ft.
Stall speed (landing flaps)	62 mph	Wing area	912 sq. ft.
Takeoff distance (grd. run) Short field technique	540 ft.	Wing loading	28.5 lbs/sq. ft.
Airline technique	940 ft.	Cabin length	28.7 ft.
Takeoff distance (over 50 ft. obstacle) Short field technique	1,020 ft.	width	87 in.
Airline technique	1,570 ft.	Engines (2)	P&W R2000-7M2
		Rating	1,450 bhp
		Propellers	HamStd 43D50
		Fuel Capacity	1,680 gals.

Is BLC* Finally Here to Stay?

BOUNDARY LAYER CONTROL, that aerodynamic tonic that has somehow eluded serious military funding since its discovery in the waning days of World War II, is finally coming into its own.

Top airline engineers such as American's W. W. "Bill" Littlewood are looking to it as the big answer to future performance improvements. Northrop, Inc. is pushing its efforts in one phase of BLC. But the most advanced of U.S. efforts has been at Lockheed, particularly that company's Georgia Division where the testbed of a BLC version of the C-130 is nearing the end of a test flight evaluation.

The Lockheed project is the most significant in many respects. For one, it is the fairest shake yet given in the U.S. to a concept that aerodynamicists have supported for years. Also, it will soon provide the acid test of whether the military is really interested in buying what its GOR's (General

Operating Requirements) say it needs and its operating personnel clamor for.

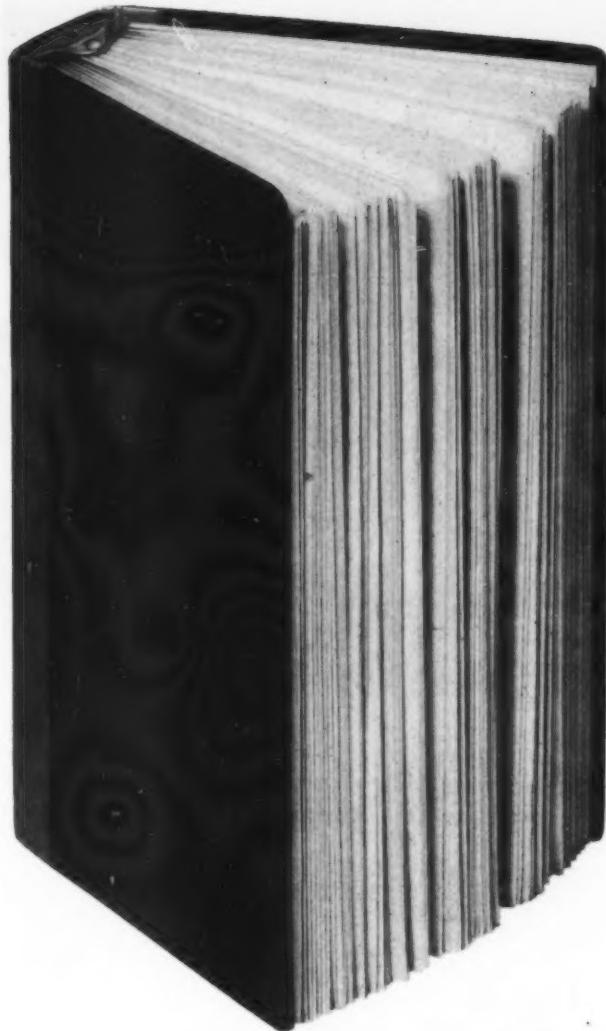
The Lockheed BLC-130 produces a marked improvement in performance over the conventional C-130B. The important one, stall speed, drops to 50 knots at 100,000 lbs. in landing the BLC-130 compared with 84 knots for the C-130B.

In a "maximum effort" takeoff situation, the BLC aircraft would clear a 50-ft. obstacle at 136,000 lbs. using only about 2,800 ft. of runway. In military operations aimed at one specific requirement it could take off at 126,000 lbs. in 910 ft. on a 1,000 n.mi. mission; land at an unprepared mid-point field using 520 ft.; take off again in 365 ft. and finally land using only 370 ft.

Flight speed penalties are negligible. On a 2,500 n.mi. mission carrying 20,000 lbs. payload, the BLC-130s average speed would be 300 knots, only about 10 knots slower than the C-130B.

Such performance benefits can easily be transplanted to

* BLC, meaning boundary layer control, is a method of delaying the separation of the boundary layer air or that air layer which exists between the wing surface and the airstream.



WE
COULD
WRITE
A BOOK
ABOUT
THIS



TAPPET ROLLER
...AND
WE HAVE

This biography was started some 30 years ago. We've set no date when we'll type "Finis." Because, like hundreds of other Pratt & Whitney Aircraft *original equipment parts*, this little tappet roller is still a subject for constant improvement.

Its life history is told in scores of operations sheets: detailed specifications, metallurgical studies, heat treatment procedures, grinding process directions, quality control reports, tests and inspection records. Every page points up the painstaking research, precision processing and continuous development which are the invisible but unmistakable hallmarks of dependability.

If you haven't read our book, you might say the tappet roller looks simple to make. That's where a look-alike substitute fools some people. But it can't fool your engine. Sooner or later, your engine detects the substitute's weakness—and you face a costly major overhaul. Failure of one small part often results in severe damage to other components as well.

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TRANS-CANADIAN MORNING



TRANS-CANADA AIR LINES has ordered three more Vanguards. This raises their total order to 23.

TCA President, Mr. Gordon McGregor said, "The most exhaustive studies by TCA's engineers have convinced me that the Vanguard will be the finest aircraft of its class in the 1960's, with exceptional passenger appeal and extremely low operating costs."

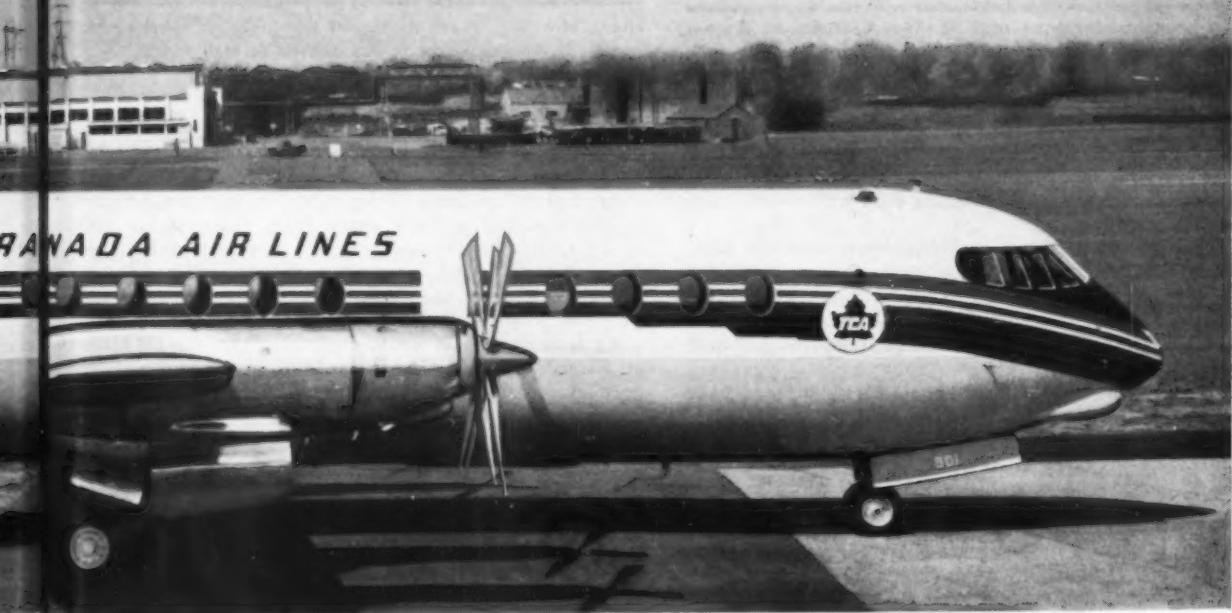
Mr. McGregor's confidence is well placed. The

Vanguard goes to TCA with all the engineering experience and more than 2,500,000 Viscount hours and turbo-prop hours "built in" its design. It is routes in the world's only second generation turbo-prop airline.

Big, roomy and comfortable, the Vanguard is built to pace the jets. In fact, this four-engine turbo-prop can generally show a better "block time" on short-haul and medium haul routes than comparable pure-jets an account

NEWEST FROM THE WORLD LEADER IN JET-PROP AIRCRAFT . . .
POWERED BY FOUR ROLLS-ROYCE TYNE ENGINES

AIR LINES ORDERS VICKERS VANGUARDS



neerland is far more economical and flexible. TCA inscoundends to operate its Vanguards on medium range is routes in North America and the West Indies. Each iner will carry 100 passengers in modern luxury, plus our and a half tons of freight.

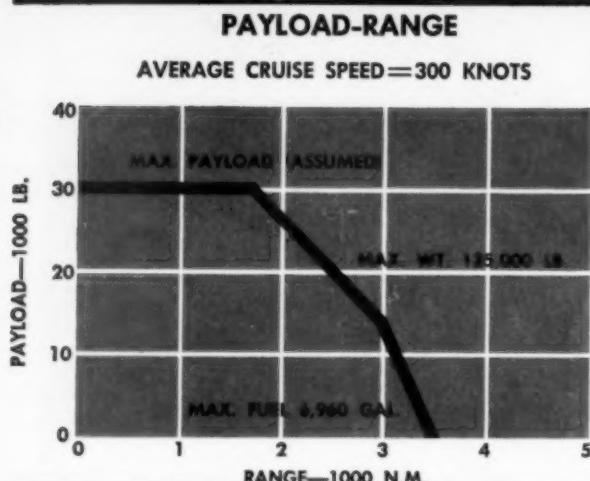
is bu-
oo-pr the Vanguard's cargo capacity is another notable
in shature of this outstanding plane. Its two huge holds
e-jets an accommodate up to ten tons of freight, so that

with only 30 passengers aboard, the Vanguard can still make a handsome profit as a freighter.

We congratulate Trans-Canada Air Lines on their choice of the Vanguard. Planned to produce high operating profits, this newest of the turbo-props is the most advanced airliner ever designed for economical operation. For further details contact Christopher Clarkson, 10 Rockefeller Plaza, New York 20, N. Y.

VICKERS
VANGUARD

VICKERS-ARMSTRONGS (AIRCRAFT) LTD., WEYBRIDGE, ENGLAND • MEMBER COMPANY OF THE VICKERS GROUP



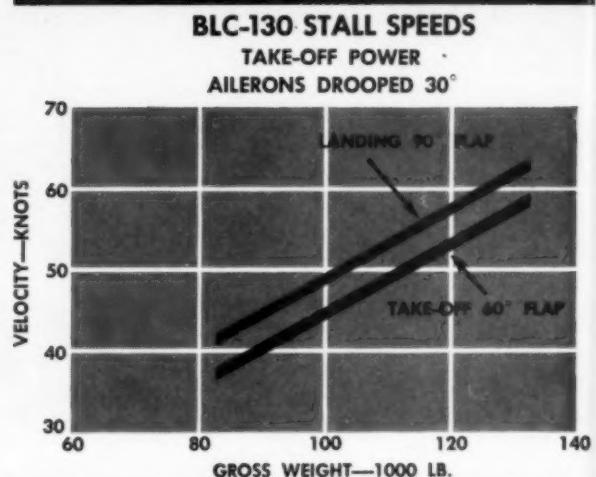
Payout-range performance of a BLC-130 operating at a gross of 135,000 lbs., 300-knot cruise with 6,960 gals. fuel.

the future big jet cargo plane.

Obviously, with benefits such as these to be realized, BLC becomes a lure to the planners of king-sized cargo jets, say of 400,000 lbs. gross, which would run out of economics on hot-day takeoff pavement even with today's two-mile plus runways.

Lockheed's BLC system uses air blown over the flaps, elevators and rudders at high velocity. Power source for the system on the testbed lies in two Allison T56 turbines although a production model would employ four Continental 356-17 (J69) jets dual mounted in pods under each wing.

A duct system ending from wingtip to wingtip and back



Here's how BLC shows its biggest advantage, in lowering stall speeds. It remains below 60 knots even at high weight.

along the fuselage ceiling to dual elevator and rudder ducts does the rest. The only other changes to the basic C-130 involve an increase of the rudder chord by 40% over the C-130B and a means to provide the ailerons with a mechanism that droops them 30-deg. when the flaps are deflected.

The BLC-130 actually stems from a November 1955 USAF GOR No. 130 and was first proposed by Lockheed in August 1956. But it wasn't until Sept. 1958, following USAF revision to the GOR, that Lockheed management gave the go-ahead to build a prototype.

By June or July of 1959, exhaustive wind tunnel testing at United Aircraft Corp.'s facilities was completed and only six months later, the testbed BLC-130 was flying.

Only Policy Drag Slows Down the SST!



SMITH

What Must Be for SST

- Government must decide to back it or take a back seat in future world air transportation.
- Without help from the B-70, it is an impossible task.
- At least one engine, a fan-burner, can be designed and built whenever it is needed.
- Some ticklish technical problems must be solved. Size? Mach 2 or 3? Structures? Sonic booms? Noise?



QUESADA

THE SUPERSONIC TRANSPORT is nearing a major crossroads, policy-wise that is. Until now it has attracted military and federal policy attention at a horse and buggy speed. But this scene is changing and a firm U.S. decision is in the incubation stage. Top officials in airlines, in manufacturing, and in government are stating their views . . . and plainly. Here's what they are saying:

C. R. Smith—American Airlines: The U.S. is a world leader in aviation and it may be of great importance in the kind of world in which we live to be sure we maintain that position. Whether we can do it if we are not willing to lead in supersonic air transportation remains to be decided.

Supersonic transports cost a lot of money to build. We

should not decide until all the facts are in hand. But we should be diligently accumulating these facts and weighing their significance.

A Mach 3 transport should be able to go from New York to Paris or London in about 2 hrs. If the B-70 can carry 40,000 lbs. for 7,000 miles then the transport would certainly do no less for a shorter journey. A 20-ton payload would allow for 200 passengers or a smaller number plus mail and cargo.

A Mach 3 transport will not be built until the ability to operate at Mach 3 has been proven. That, of course, could be done by starting such a transport from scratch. The usual way, and the better way, would be to develop a Mach

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3 military machine first. The best opportunity to do that lies in the completion of the B-70 program.

The very high capital cost of a Mach 3 development program places it beyond the ability of a privately-owned aircraft manufacturer. He just does not have that much capital and cannot afford to take so large an economic risk.

If a Mach 3 airplane should be built in England, it would have to be sponsored and supported by the British government. The same for Russia. If it is to be built in the U.S., then the U.S. must be behind the project.

It is likely that a supersonic transport will be designed and built by some nation. It may have a decisive effect on world leadership in aviation. If some other nation is first, then the U.S. would be required to "catch up" and it probably would cost no more to lead the way into supersonics than to catch up at some later date.

FAA Administrator E. R. Quesada—Without continued support of the USAF's B-70 development, successful production of a supersonic transport would be impossible. Proper B-70 support might solve as high as 80% of the problems of a transport version.

Any commercial supersonic airplane must be generally compatible with runway lengths of existing airports. Large wing areas, combined with large powerplants, would keep runways within present limits for subsonic jets. A system of royalties paid on all production aircraft, similar to that used by the British government in the Viscount development, may be the answer to financing a commercial superjet.

J. B. Montgomery—General Electric: GE can produce a new type jet engine capable of powering a 2,000-mph jet transport whenever it is needed. It would be a fan-burner, a design burning fuel in the exhaust of a fan mounted directly aft of the basic J93 (B-70 engine). The transition to tomorrow's supersonic jet engines should certainly be no more difficult than already accomplished from pistons to jets. Beyond 2,000 mph, the state of the art must progress further.

J. O. Yeasting—Boeing: If the U.S. is to retain its dominant role in air transport it must initiate an intensive development program in the very near future. It must include, (1) an intensified research effort by the National Aeronautics and Space Administration and, (2) the design, construction and flight evaluation of *two or more* competitive prototypes.

Boeing engineers estimate it will cost \$50 million to develop and build a Mach 2 (aluminum) supersonic jet and about double that amount for Mach 3 (steel). A Mach 2 design could be flying by 1963, Mach 3 by 1964-65.

What difference would it make? On one key world traffic segment (New York to London) the \$50 million extra to reach Mach 3 would mean about 45 minutes less flight time for the 3,000-n. mi. trip. Up to speeds of Mach 2 or 2.5 large block time savings can be realized with increases in cruise speed, but beyond that the savings diminish and become relatively insignificant. The airplane must have nonstop capability over key world routes and with economy to be considered, will result in a supersonic transport grossing more than 400,000 lbs.

Ira H. Abbott—NASA: A national project combining the talents and finances of government, aircraft manufacturers and airlines should be set up to get supersonic transports operating over world routes in eight to 10 years. Ultimate development costs would reach \$1 billion, despite use of knowledge gained from the B-70. Airports would not be made obsolete, although runways would have to be strengthened; ATC systems would have to be revised extensively; and, the realistic SST would have subsonic performance for takeoff and landing to alleviate the sonic boom problem and Mach 2 and 3 capability above 40,000 ft.

Problem areas: One of the best appraisals of problems posed by supersonic jets is that of Boeing's full-time SST

engineering manager Lloyd T. Goodmanson.

Some examples: **Increased fuel tank pressurization** will be needed to prevent fuel boil-off at high temperatures and for flight above about Mach 2.8, a positively reliable fuel tank inerting system must be used. At this speed the temperature is high enough for fuel vapor to ignite spontaneously.

Skin-stringer type wing structures must give way to sandwich types but brazed steel honeycomb is very costly. A low-cost steel structure suitable for supersonics must be developed before the greater speed of the steel airplane can be applied to economic transport operation.

Explosive decompression? It will cost an extra 1,000 lbs. in extra weight to put windows in a Mach 2 transport, even more for Mach 3. One alternative would be a flat-tube TV screen which could save weight and give the passenger a better view of takeoff and landing than he has today from a side window.

Sonic booms? Only in the last year tests have shown that the intensity of sonic booms reduces much less favorably with altitude than believed earlier. Although small aircraft present no problem, the effect of lift on a large supersonic transport cannot be neglected and the boom intensity will be more serious than had been predicted. Unless the public will become accustomed to close-range thunder on a clear day (or accept this new noise as yet another cost of progress), the only alternative will be to fly our supersonic transports only over oceans and over land areas of very low population.

USAF Sets Specs for Civil-Military Cargo Aircraft

THE MUCH TALKED ABOUT optimized, uncompromised civil-military cargo plane has been nailed down (as to specifications, that is) in everything but speed.

The end result contains but a few variations from the Military Air Transport Services jet specifications disclosed several months ago (*AIRLIFT*, April). Here are the new figures as stated in USAF SOR 182 dated May 4:

Payload capacity (structural)	60,000-70,000 lbs.
Cargo cubic capacity	6,000 cu. ft.
Cargo envelope	Length 70 ft. Width 10 ft. Height 9 ft.
Max. runway/full load	6,000 ft.
Altitude capability (minimum)	25,000 ft.
Range (except Transpacific)	4,000 n. mi.
Transpacific	5,500 n. mi.
Commercial (with 60,000 pound payload)	.3,000 n. mi.
Cargo floor height (truckbed)	.48 in.
Floor loading	.200 lb./sq. ft.
Crushing stress	.750 lb./sq. ft.
Cargo safety aisle (width)	.14 in.

Other requirements: **Speed**—as fast as possible but ATC holding pattern speed must be equal to that of aircraft being replaced; **Maneuverability**—capable of a 180-deg. turn on a 150 ft. wide runway; **Side loading**—door must measure 108 by 78 in.; **Tiedowns**—load restraining gear of 5,000-lb. capacity on 20-in. grid pattern plus extreme side fitting of 10,000 lb. capacity; **Engines**—must be in a production status by 1963 to be eligible; **Aircraft availability**—must be able to meet operational target of not later than fiscal 1964.

Conversions Skyrocket Cargo Capacity

Roster of airlines looking to cargo conversions as interim equipment continues to mount. Total fleet could hit 250 by end of 1961 if pace continues

THE MUCH TALKED ABOUT shift to air cargo is taking place, right now. An onslaught of passenger transport conversion projects is boosting capacity in all-cargo aircraft at a prodigious rate—as much as 1,000 percent in the months ahead, according to one estimate.

Airlines that never had all-cargo fleets or major cargo sales organizations, including both Eastern and TWA among the so-called "Big Four" airlines, have made the shift.

At last count, U.S. airlines alone will have added at least 35 converted DC-7 and Super Constellation aircraft to their fleets by June 30. The second half of this year will see an equal number added to the list.

At least 10 foreign flag airlines are doing the same and with others expected to follow suit, it is conceivable that the 1960-61 period will produce as many as 250 all-cargo transports operating on world airline routes.

And where lack of faith in the future of cargo may have been a deterrent in the past, the pace at which jets are obsoleting piston planes for passenger service, plus the lack of a used passenger-plane market, is certain to spur new management zeal to sell more airfreight.

Carrier by carrier, management is becoming cargo conscious. Those that already were are becoming more so. American, for example, after planning to convert 10 DC-7s to all-cargo, has upped the figure to 15.

Pan American, with 10 DC-7s in conversion and 10 more optioned for changeover, is expected to wind up with a 25-plane cargo fleet.

United, with the first of its converted DC-7s in service, estimated its all-cargo lift capacity would increase by 93% by the year-end.

The activity is by no means confined to the U.S. Air France, Air India, Alitalia, Japan, Lufthansa, KLM, Qantas, Sabena, SAS, TAP (Portuguese) are airlines that have made a move or are expected to do so shortly.

And the new interest in cargo is being supported by traffic statistics for the first quarter of 1960.

American operated 27.2 million ton-miles of airfreight in the first three months, up 31% over 1959. Pan American experienced a 50.3% hike in transatlantic volume, 37.3% in eastbound traffic and 66.5% westbound. V.P. Willis G. Lipscomb specifically attributes the increase in westbound traffic to new DC-7F service which departs Europe in the evening and arrives in New York the next day.

Pan Am on April 30 expanded its all-cargo service with DC-7 equipment into the Pacific with three all-cargo flights a week from the west coast to Tokyo. Until now it used a Boeing Stratocruiser and DC-4s in the Pacific.

Swissair, with 4.16 million ton-miles, was up 26% in overall airfreight, whereas actual capacity offered rose only 4%. Airfreight traffic to the Near and Middle East climbed 95%, to South America 50%, to North America 22%, Far East 18% and Europe 10%.

During the second half of this year the carrier will increase its available transatlantic capacity four or five-fold



Good index of effort being directed at cargo is new jet PAAK developed for Pan Am by Lockheed Georgia Division, reputed to permit handling of about 10 tons of cargo in 20 minutes. Each container holds 1,500 lbs. of cargo.

westbound and seven or eight-fold eastbound.

Alitalia ended the first quarter with a 67% increase in cargo over 1959 on eastbound flights and 102% westbound. The combined increase, both directions, was 87%.

On the domestic scene, National Airlines reported a jump of 12% to 1,552,361 lbs. in airfreight originating from New York for the first quarter. Continental said its daily jet cargo capacity was being increased by more than 30% during May, bringing its total daily airfreight capacity to 400,000 pounds.

Eastern, which last year reorganized its entire cargo sales management with the emphasis on a new major push into the field, places its first converted Super C Constellation in operation on June 1. Remaining four are expected to be in service by the end of June.

All-Cargo Fleets at a Glance

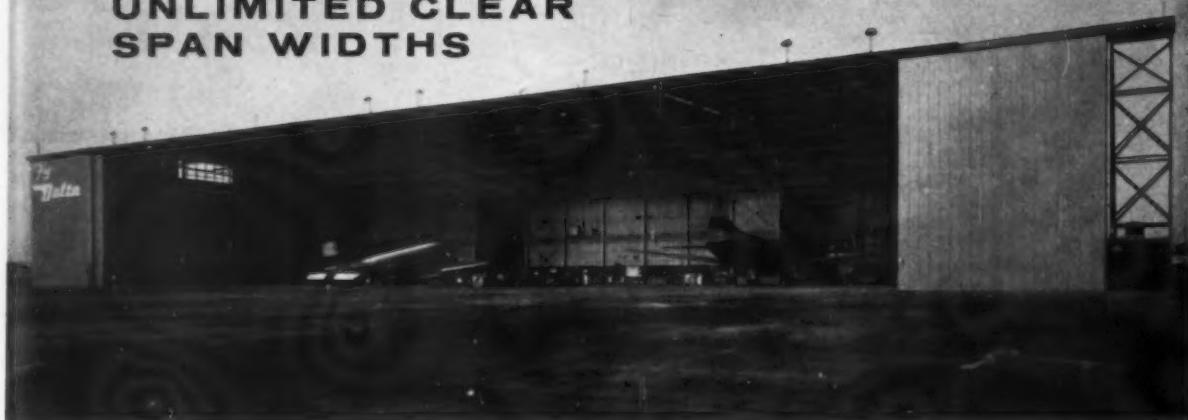
AIRLINE	NO.	TYPE
Air France	4	1649
American	10	DC-7F
Air India	2	1049G
Alitalia	2	DC-7C
Lufthansa	2	1649
Eastern	5	1049C
KLM	2	DC-7C
National	2	1049G-H
Panagra	1	DC-7B
Pan American	10	DC-7C
Qantas	2	1049G
Sabena	2	DC-7C
SAS	4	DC-7C
Seaboard & Western	2	DC-7C
TAP (Portuguese)	2	1049
TWA	8	1049H
	2	049
	5	1649
United	6	DC-7F

New Cargo Aircraft Orders

Flying Tigers	10	CL44
Riddle	5	Argosy
Seaboard & Western	5	CL44

ECONOMY OF DESIGN—Permits Cantilever depths of as much as 180 to 200 feet . . .

UNLIMITED CLEAR SPAN WIDTHS



Pictured above is the Delta Airlines medium size hangar. It serves as a turn-around base for two DC-8's or Convair 880's. When the future demands more space this hangar can easily be modified to meet any requirements. This first investment never becomes obsolete or outmoded.

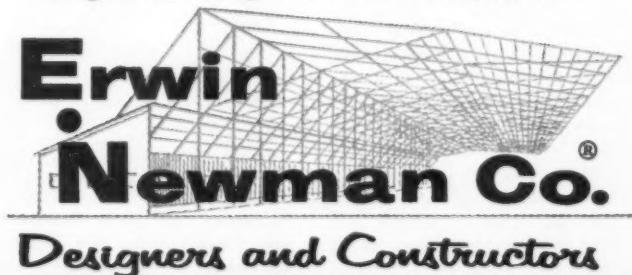
ERWIN-NEWMAN *Suspended Cantilever* provides for future EXPANSION

The economy and utility of ERWIN-NEWMAN Suspended Cantilever design provides the ultimate in hangar construction. ECONOMY—The suspended cantilever hangar is considerably cheaper than older style cantilever (from \$5.00 to \$10.00 less per square foot). UTILITY—Suspended Cantilever construction permits depths of 180 to 200 feet and clear span widths up to several hundred feet. ERWIN-NEWMAN hangars are built with the expandable future in mind—depth and width can be increased, vertical clearance can be added by placing tail gates at any number of points desired, across the front.

ERWIN-NEWMAN Cantilever type construction, engineering and fabricating has proved to be the efficient and economical answer for hangar requirements for fixed base operators, corporations, airports and airlines throughout these United States. ERWIN-NEWMAN has designed and constructed over 400 commercial hangars in the last twenty years. This "hangar know-how" can save you money in initial cost and hold to a minimum future expansion cost as needed.

Consult us (no obligation of course) before you plan or build a hangar of any size. ERWIN-NEWMAN will be glad to meet with you for talks on preliminary plans or any stage of planning.

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- Facing Cantilever

- Any Height
- Any Length
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NWA facility as it will look when completed. At upper right of hangar is engine shop. Top center is office building now underway.

NWA Opens World's Finest Jet Facility

With more than a million square feet of floor area, the Twin Cities overhaul base is modern, efficient, up-to-date

By WAYNE W. PARRISH

SOMETIME THIS MONTH Northwest Airlines will have completed moving into its huge new maintenance and overhaul base at Minneapolis-St. Paul International Airport.

Sometime in 1961 when the general office building is completed adjacent to the base, NWA will be housed in a single facility for the first time in its history.

NWA claims it will have the "most efficient, modern, up-to-date airline facility in the world."

No visitor is likely to challenge the claim. If there is a finer facility anywhere, this writer hasn't seen or heard of it. Northwest's base will be a mecca for air transport visitors the world over. It's a model of planning for efficiency.

The cost of \$17.5 million might indicate luxury. Not so. There isn't a dollar of fluff in the entire project.

Proudest man in the Twin Cities is NWA's president Don Nyrop, despite the headaches he's had with the Electra accident. He might well be proud because he's got a base like none other anywhere. Also proud are Dale Merrick, ass't. v.p.-properties, and Robert Ritchie, project engineer, who can take bows for getting the job planned and completed.

By the end of June, NWA expects to have everything moved out of Holman Field, St. Paul, the maintenance base for many years. Sometime in June, NWA will have an open house for employees and their families, and anyone else who would like to see the base.

Built on a 76-acre site on what used to be called Wold-Chamberlain Field, the base is being financed by a Metropolitan Airports Commission issue of 30-year, tax-exempt general obligation bonds. A key figure in executing the project was Robert Aldrich who until recently was executive director of MAC.

The bond issue was authorized by a special act of the 1956 Minnesota legislature on the condition that the proj-

ect be self-sustaining. Average interest rate over 30 years is 2.7437 per cent. Bonds mature in 1988. NWA is paying off the bonds through semi-annual interest and principal payments.

The base is the property of MAC and is being leased to the airline. The MAC is the governing body for all Twin Cities airports.

Components of the base are the five aircraft maintenance hangars, the engine overhaul and shops and stores building, the general office building, and the engine test building. The first three are all in one compact package. The engine test building is not far away.



Northwest's president, Donald W. Nyrop, proud head of the new facility, came to the airline as top executive less than six years ago after holding the No. 1 post in both CAB and earlier CAA (now FAA).



MERRICK



RITCHIE

AIRLIFT

Two c
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JUNE,

Since the hangar frontage is 1,600 feet, and the five hangars have a total floor area of 256,000 sq. ft., some idea of the impressive size can be gained. Each hangar can easily accommodate two DC-8s, and each is fitted with four sliding door sections, each section being 80 feet wide and 48 feet high, and each section weighing 22 tons. The hangar portion was built at a unit cost of \$15.83 per square foot.

The engine overhaul, shops and stores building covers 451,472 sq. ft. at a construction cost of \$13.61 per square foot.

The engine test building cost \$359,669, and has a half million dollars worth of instrumentation and test equipment installed.

The general office building will contain 316,923 sq. ft. and will cost \$4,180,451, or \$13.98 per sq. ft. Steel work is now 70% completed. It will be completely air-conditioned. In addition to offices it will contain the flight kitchen, cafeteria, print shop, training activities, and similar functions.

One of many unique features of the base is NWA's system of distributing and reclaiming its "Oleum" cleaning solvent through 8,000 feet of plumbing from a 10,000 gallon storage tank, located in the boiler house, to cleaning stations in various shops and hangars. Another line returns used solvent to a series of settling tanks in the boiler house where it is reprocessed by a still and filter system and returned to the storage tank for reuse.

Minnesota liquor law requires NWA to have a license to operate its still, undoubtedly an industry "first."

When it comes to conveyor systems, NWA has four units totaling 5,000 feet in length for engine cylinders, parts and materials, all carried in baskets which can be tripped off automatically by pre-selected devices at any desired station. It is the most elaborate system in the industry.

Monorails are also extensively used, there being six in all, with seven bridge cranes in as many locations.

NWA also has its own water supply system from two 420-foot wells which supply a 500,000-gallon underground tank for all normal water uses in addition to the fire protection system. There are even two large water-softener systems installed.

Despite the huge size of the base, there are no windows anywhere, including the general office building, except for two windows at one of the delivery points.

NWA officials visited many airline bases gathering ideas. The Walter Butler Co., St. Paul, was the architect-engineer for the facility.

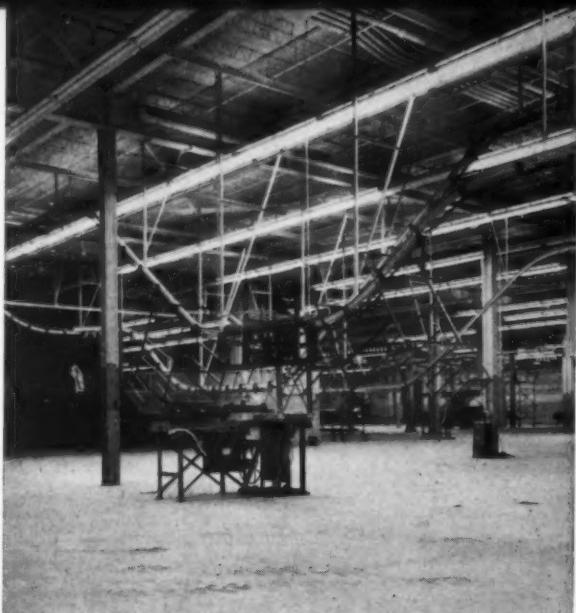
So You Don't Think It's Big?

Eye-opening facts on NWA's new base:

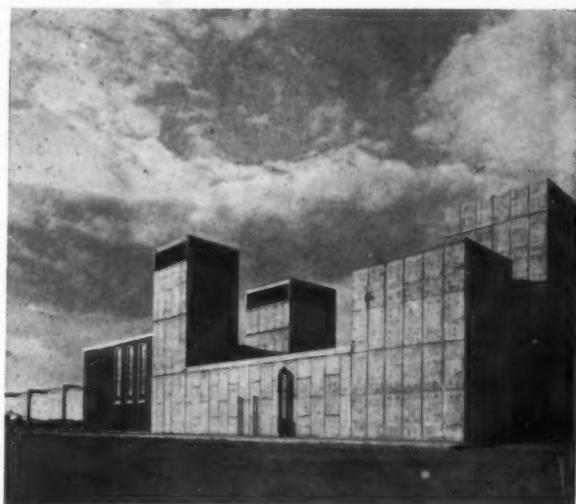
- Total cost: \$17.5 million
- Floor Area: 1,114,307 sq. ft.
- Utilities would support a town of 15,000
- 36 miles of neon tubing (if stretched end to end)
- Five maintenance hangars, 320 by 160 ft. each, bigger than five football fields
- Into construction has gone: 6,000 tons of structural steel, 1,100,000 bricks, 385 miles of copper wire, 87 miles of steel conduit, 40 miles of plumbing pipe, 200,000 concrete blocks, and 45,000 cubic yards of concrete.

There are exactly two windows, no more, in the entire facility.

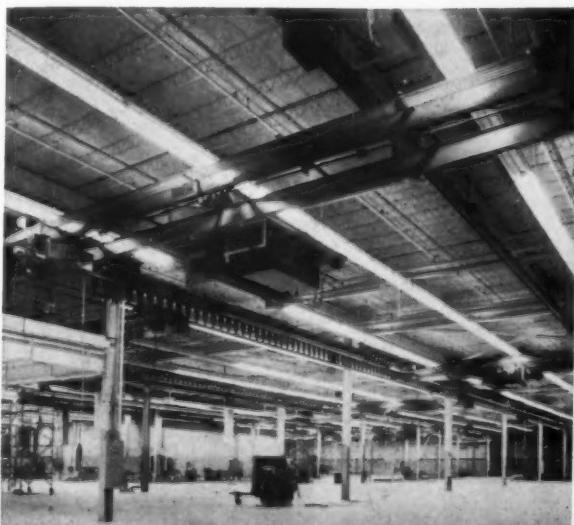
Two crane runways, 300 ft. long with 40 ft. span, carry three-ton hoists and move J75 engine through entire overhaul.

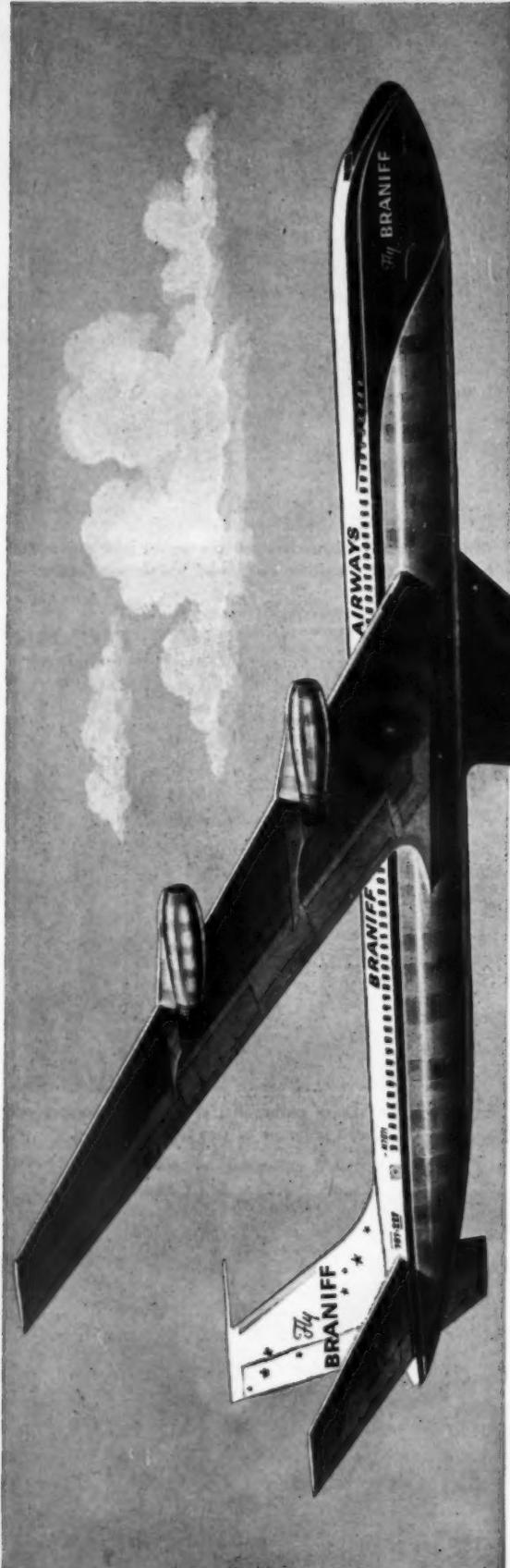


Northwest shop is fed by mechanized conveyors with automatic drops for materials from other shops and warehouse facility.



New test cell has overhaul monorail (far left) to transport engines to cell. Jet test cell is larger of two in background.





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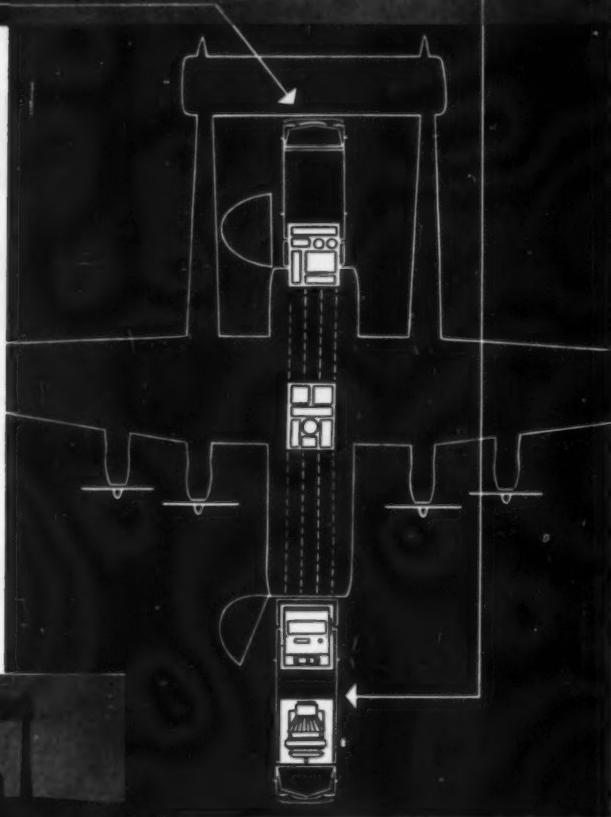


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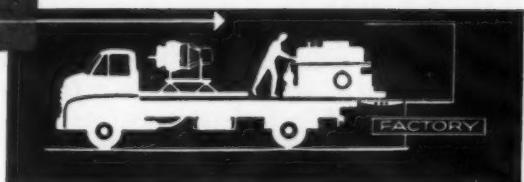
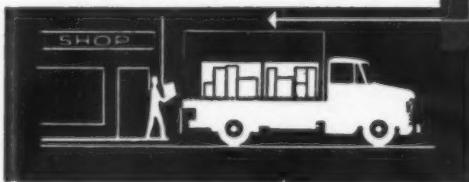
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DRAMATIC ANSWER TO THE AIR CARGO DILEMMA

Many air carriers, striving to answer perplexing questions presented by a growing air cargo industry, are facing a basic decision: should they convert outmoded piston engine passenger equipment and put it on to air cargo routes? Should they order proposed cargo jets with 100,000 lb. payloads? Should they wait for further turbo-fan evaluation before making their air cargo plane commitments?

Canadair's Forty Four, offers a simple, practical answer to these vital questions. It is an optimum-size, all-new, all-cargo turbo-prop airplane that, in terms of productivity, is vastly superior to converted piston engine equipment, and one that offers, in comparison with the big jets, a payload capacity that is not unrealistically high for profitable operations during the 1960's. Furthermore, the Forty Four suffers little or no operating penalties due to runway limitations, and there will be no community noise problems.

The Canadair Forty Four has a productivity two to three times that of converted piston aircraft, at the same cost per airplane mile, and has a profit potential that will quickly recover any losses on disposal of piston engine aircraft now being used or contemplated for cargo usage. On the other hand, the Forty Four with a payload capacity of 65,000 lbs. and low break-even point is ideally matched to the natural expansion of the cargo market and will begin immediately to operate at profitable load factors.

The Canadair Forty Four is flying now and is in production for the three largest all-cargo carriers in the United States, and

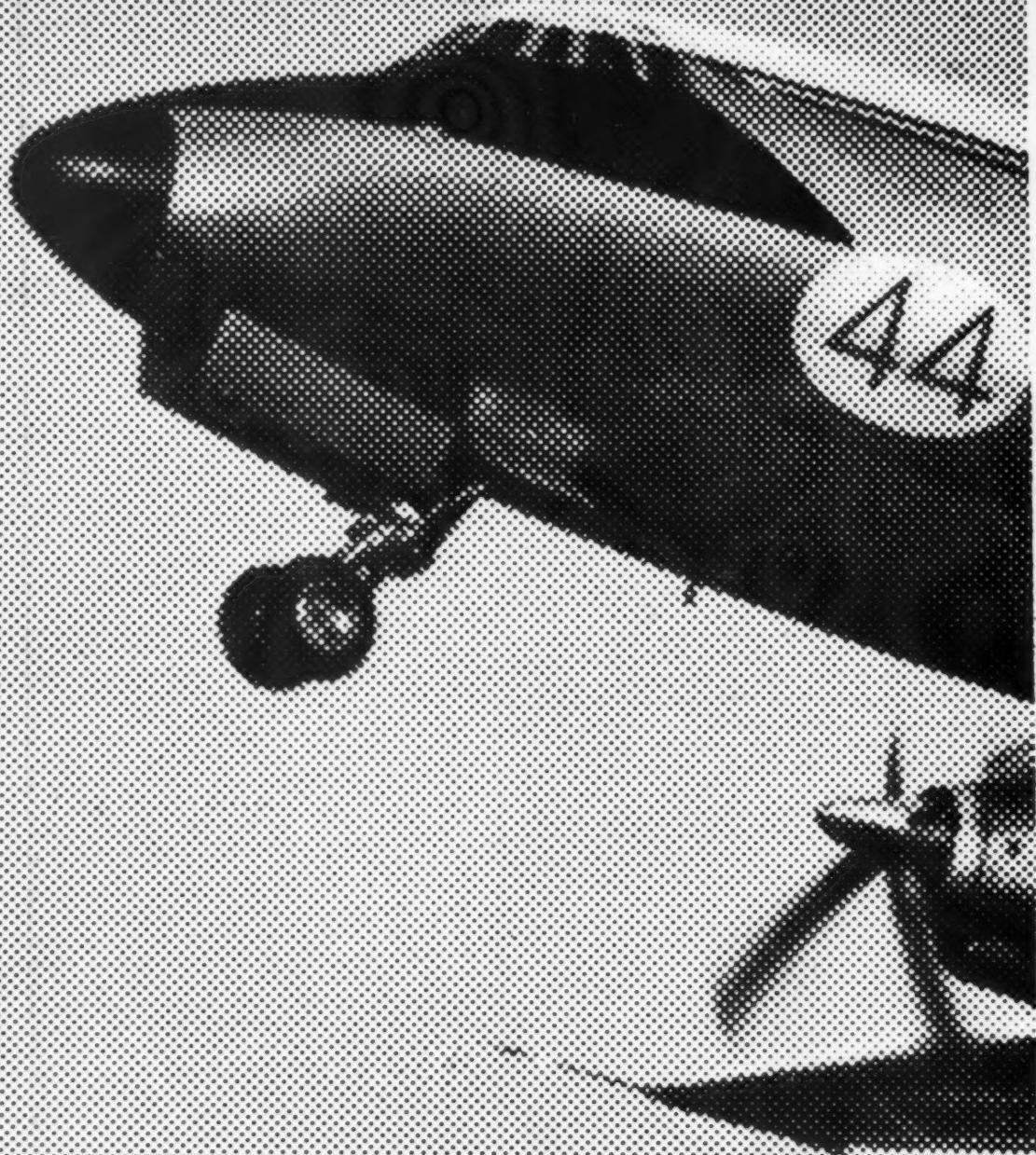
can be introduced into existing fleets as early as January 1961. The Canadair Forty Four can operate in and out of all airports presently used by four-engined piston-powered aircraft. For example, at such an important airport as Midway, in Chicago, with only 6400' runways, the Forty Four can take off with 90% of its maximum payload and fly non-stop to San Francisco. Sophisticated design features, including swing tail and integral cargo handling equipment, slash direct and indirect costs. Step-by-step savings and economies inherent in the Canadair Forty Four, combined with its very attractive price, let precious capital dollars work for better return quicker than other "proposed" equipment.

Thus General Dynamics Corporation's Canadian subsidiary, Canadair, the specialist in air cargo, proposes the Forty Four as the answer to air cargo's biggest dilemma.

Principal Features of the Canadair Forty Four

1. Low prime cost—less than $\frac{2}{3}$ the price of proposed jets.
2. Low operating costs—estimated at \$1.30 per aircraft mile, and less than 4¢ per ton mile.
3. Right size for the 1960's—its present payload capacity is ideally matched to forecasted requirements.
4. No community noise problems—confirmed during present flight testing.
5. No airport or runway limitations—every major airport open to the Canadair Forty Four.
6. Growth potential—able to grow with the market.
7. Available for delivery in January 1961.

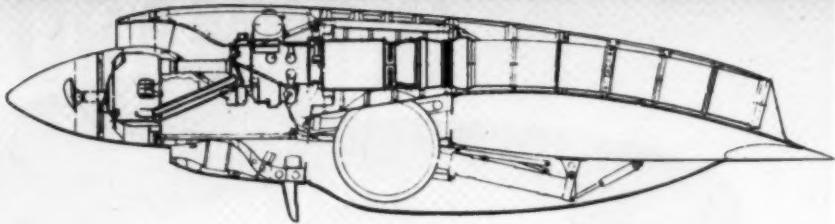
**CANADAIR LIMITED, MONTREAL, CANADIAN SUBSIDIARY OF
GENERAL DYNAMICS CORPORATION**



CANADAIR FORTY FOUR

41

Most significant changes to Electra to correct for oscillation will be in powerplant installation (right).



Fixes to Speed Electra Comeback

Unprecedented investigation and findings promise design changes as early as July

THE LOCKHEED ELECTRA is on the comeback trail. Only 53 days after the March 20 loss of a Northwest Airlines' Electra at Cannelton, Ind. (often erroneously sited at Tell City), Lockheed Aircraft Corp. has pinpointed the Electra structural problem and is moving ahead to design the fixes.

The cause: In Lockheed's words—dynamic coupling at high speed of oscillatory movements of the outboard power package nacelle and the wing. In less technical terms, as best as can be determined, the Electra problem stems from some form of damage that reduced the stiffening of the outboard engines and props and permitted them to begin moving both vertically and laterally in what is described as a "swirling" motion.

But this damage itself wasn't sufficient to cause the accidents. It had to be aggravated by some other force such as high speed, turbulence, or the like. But once triggered, its effect was rapid, taking possibly as little as 40 seconds, according to some observers.

Building up to a frequency of some 2-3 cycles per sec-

ond (about the natural frequency of the wing structure), the nacelle oscillations would couple to the normal movements of the wing (like pushing a swing) to build a combined force up to the breaking point of the wing-to-fuselage structure.

In both the Cannelton accident and that experienced by Braniff at Buffalo, Tex. on September 29, 1959, distribution of the major Electra components indicated an initial failure of the wing at the fuselage butt joint.

In the Braniff incident (see sketch) the left wing failed first followed by separation of the right wing just inboard of the outboard nacelle with loss of segments of both horizontal stabilizers as well as both outboard power packages. In the NWA accident, the right wing failed and the left wing separated between the outboard engine and wingtip with other damage very much paralleling the Braniff airplane.

Lockheed's feat in pinpointing the source of the problem in less than two months has been little short of phenomenal. The British Comet episode, which it matches in significance, required 6-8 months to find an answer. A team of 250 Lockheed engineers worked day and night, 80 hours a week, on the study. One aspect alone placed as many as 59 equations into a computer for simultaneous solution.

Now, engineering fixes are underway and should be in the hands of the Federal Aviation Agency at least by early June. Tests by the National Aeronautics and Space Administration at Langley Field are now getting underway with a 1/8 scale model and are expected to confirm Lockheed's findings.

Actual modification of airline Electra fleets may start as early as July and can be accomplished in the field much in the fashion of the earlier Electra nacelle uptilt program. Some estimates place the rework period at 15 elapsed days but accurate information will not be known until the final bill of work is decided upon and approved by FAA.

The same conditions apply to reports that Allison already has come up with a new top cowling arrangement for the Electra nacelle, presumably including provisions that will remount the engine and gear box to assure the stiffness of the power package installation.

FAA will handle the Lockheed redesign proposal under the provisions of CAR Part 1.24 which says, in effect, that design changes to correct an unsafe condition must be approved by FAA and until they are, the "product" can only be operated under specified conditions and limitations, including inspections, as authorized by the Administrator.



Result of dynamic coupling in first Electra accident. Only failure at left wing butt is significant. In second accident right wing failed.

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First Jet Overhaul Results at AA

By JOSEPH S. MURPHY

THE JET TRANSPORT, a confirmed success as a booster of passenger load factors in airline operations, is proving just as phenomenal a bonanza in the overhaul shop. The Boeing 707 jet and its Pratt & Whitney JT3 engines, first to taste overhaul at American Airlines' Tulsa Jet Maintenance & Engineering Center, are outdoing the most optimistic of airline planners.

With the first dozen or more aircraft already through their 2,400-hour main base check, as AA calls them, the workload has dipped smoothly down a planned learning curve from 13,500 manhours to about half that figure.

Similarly, the JT3 engine has dropped from a 1959 average of 1,784 manhours per engine to 1,537 in the first month of 1960.

American is cycling each of its 707s through Tulsa at 2,400-hr. intervals. The first, which arrived in November, took 33 work shifts and about two weeks from arrival to departure. This was pared back to 23 shifts and one week by the sixth aircraft and to 21 shifts on the 10th airplane.

In post-overhaul test flights, the 707 has performed remarkably well. From the start it averaged between 3.5 and four flights per aircraft compared with slightly more than four for piston types. Within two months, AA managed to bring the jet figure below three. Test flight complaints, which averaged more than 100 per plane at the start, have been cut back to about 65.

In workload distribution, the 6,425 manhours being expended by American break down like this:

Powerplants—150 manhours. Engines are not changed during Tulsa visits unless due.

Repairs—2,080 manhours, including structure (700), interior (700), systems (200), controls (250), painting (200) and electrical (130).

Routine Periodics—1,095 manhours including cleaning (200), structures (150), interior (150), systems (375), controls (70) and electrical (150).

Engineering changes—1,800 manhours.

Indirect Labor—1,300 manhours. AA charges lead mechanic time as indirect and does not preplan for sick time or vacation relief.

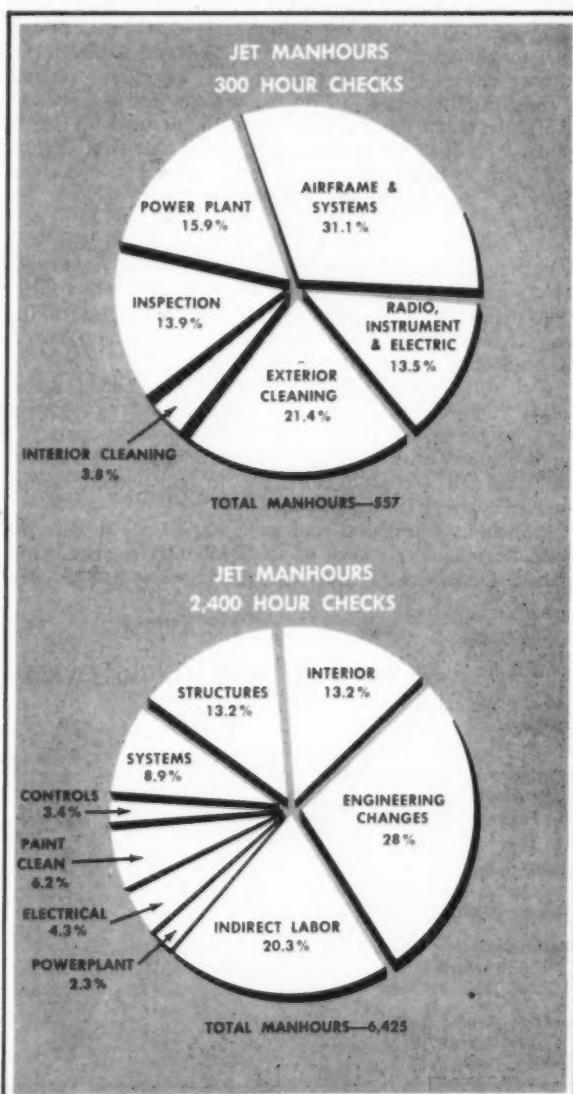
Total manhours—6,425. This does not include about 500 manhours allocated to inspection. Inspection workload has dropped on learning curve from 908 manhours at the start to about 550 on the 11th airplane.

At present, the 707 utilization for AA is running 7.5 hrs. per day making visits to Tulsa about nine to ten months apart. This, AA planners feel, is about long enough for the big jet to go without a major cabin reconditioning and they don't at all subscribe to the theory (*AIRLIFT*, April) that fixed-base overhaul can be disposed of entirely by spreading the workload at 200 or 250-hour intervals.

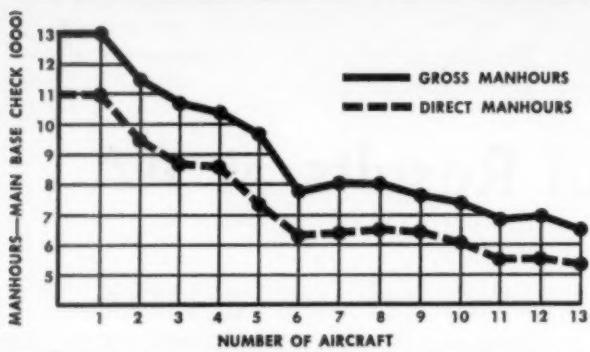
With engineering changes, it's a different story. Much of this work is being diverted from overhaul to line maintenance. Since the 707 entered service, AA has issued more than 300 fleet campaign directives (special inspections) and 700 engineering releases, a healthy share of which

have been assigned to its jet field headquarters at Los Angeles and to other major maintenance centers.

Between Tulsa visits American gives each 707 a 50-hour service check, a 100-hr. engine check and a 300-hour periodic inspection. In this latter check, AA's asst. v. p. for aircraft maintenance, A. E. Smick, points to some impressive results.



Here's how workload distribution breaks down at American in line maintenance (top) and overhaul (bottom) during the first months of 707 experience.



Manhours for 707 overhaul have dropped from 13,000 to about 6,500 from the first to 15th airplane through Tulsa shops.

During March, says Smick, American successfully geared its 707 field maintenance to accomplish the 300-hr. checks in an average elapsed time of 15.5 hrs. This includes everything—557 manhours of routine and non-routine work; 28.6 manhours of interior cleaning and 160 manhours of exterior cleaning, aircraft moving time and engine runup.

Field experience on 707 engine changes also has reduced JT3 replacement time to eight elapsed hours and 32.1 manhours. This includes engine replacement and trim check.

To gear its field maintenance to the pace of jet operations American revamped its organization after only a few months of 707 service. Based at Los Angeles and head of a special field service group is F. J. "Abe" Hoyt, the man who sparkplugged AA's military maintenance operations for the Air Transport Command during World War II. Hoyt heads a 10-man 707 team made up of service engineers and maintenance specialists charged with tackling and licking jet headaches on the spot as they crop up.

With this change, AA managed to cut its percentage of delays charged to maintenance from 16.2% in 1959 to 9.8% so far in '60. It hopes to hit 5%, perhaps lower. To speed communications in field jet maintenance AA recently commissioned a coast-to-coast private line phone network used exclusively by maintenance.

Probably the brightest spot in jet experience to date has been the reliability record of the P&W JT3 engine. In the first 13 months of 707 service American has had to over-

haul only 12 engines following premature removal. It operated the first four months without a single failure. Instead of an anticipated failure rate of 1.5 engines per 1,000 hours, the first year of operation produced a rate of only 0.38 per 1,000 engine hours.

Most of the premature removals have stemmed from "hot section" causes (25 out of the first 56 premature removals). A large share of these were restored to operation without overhaul. In fact, American has found the cold section of the JT3 in such good condition at teardown that it is now looking to FAA and Pratt & Whitney for an approved 2,000 hrs. on cold section overhaul.

An approach similar to this has been pioneered by General Electric and approved by FAA for the CJ-805 in the Convair 880 so a similar OK is anticipated for the JT3.

American's engine overhaul involves 20 engines to keep the pipeline moving although seven of these are not in what one would call production stations. These include

AA Footing Big Bill for Jets

The scope of jet airframe and engine overhaul operations is big, much bigger than anything that has existed before in airline maintenance. Workshops built for the 707 by Birmingham Steel alone cost \$160,000, about triple that of an original DC-3 aircraft. The engine shop is no exception.

In engine and aircraft accessory test stands American Airlines has spent \$1,273,400 on this list of selected items:

Test Stand	Manufacturer	(approx.) Cost
Constant Speed Drive ..	United Mfg. Co., Hamden, Conn. . .	\$ 44,000
Engine Buildup Elevator ..	Colson Corp., Somerville, Mass. . .	5,000
Freon Package	Flight Support, Inc., Metuchen, N. J.	30,000
Fuel Control	Flight Support, Inc., Metuchen, N. J.	31,000
Fuel Nozzle	Nankervis, Inc., Detroit, Mich.	19,000
Fuel Pump	Flight Support	26,000
Hydraulics (2)	Flight Support	(1) 20,000 (1) 14,000
Jet Test Cells .....	..	1,000,000
Misc. Fuel Valves	Flight Support	22,000
Starter	Flight Support	32,400
Water Pump	Flight Support	30,000
Total		\$1,273,400

Note: Dual test cells with Durastack silencing by Industrial Acoustics Co., New York City

HOW JT3C-6 OVERHAUL COSTS BREAK DOWN

	Inspection	Overhaul	Work Station			Total
			Support Shops	Instruments	Accessories	
Labor Hours—						
1959 Average	446	882	105	.....	351	1,784
Jan. 1960	253	794	94	6	390	1,537
Labor Dollars—						
1959 Average	\$1,435	\$2,518	\$342	.....	\$1,238	\$5,533
Jan. 1960	854	2,478	279	\$17	1,156	4,784
Material Cost—						
1959 Average .....	.....	\$6,686	\$497	.....	\$3,055	\$7,453
Jan. 1960 .....	.....	8,649	401	\$40	2,535	8,845
Outside Repair Costs—						
1959 Average .....	.....	\$ 523	\$ 8	.....	\$1,855	\$2,386
Jan. 1960 .....	.....	3,237	.....	.....	52	3,269
1959 Average-Total Dollars	\$1,435	\$ 9,727	\$847	.....	\$6,148	\$15,377
January, 1960-Total Dollars	\$ 854	\$14,364	\$680	\$57	\$3,743	\$16,918

Note: Dollar totals include \$2,780 per engine in credits from manufacturer for items that did not meet original guarantees.

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one awaiting dismount, two in a parts control center and four undergoing repair. The remaining 13 include one each in dismount, disassembly, cleaning and inspection, two in sub-assembly, five in final assembly, and two in the test cells.

The elapsed time through AA's shop for the first 100 engines has been 18.7 days on a one-shift per day basis. The subsequent 37 engines overhauled averaged 14.5 days, also on one shift.

American's jet test cell experience shows that four man-hours (4 men, 1 hr.) are needed to prepare a jet for test; the same time is allocated for hanging an engine; run-in requires four manhours (2 men, 2 hrs.). Removal requires 12 manhours, (3 men, 4 hrs.).

AA has run engines through the cell from a low of two hours and high of 4.5 hours and has averaged 2 hrs. 20 min. Half of the engines go through the entire test run without shutdown.

Insurance Costs: '59 Bad, '60 Worse

AIRLINE INSURANCE costs are spiraling. The worst is yet to come.

Watch for 1960 to show terrific increases. Insurance is a principal contributor to airlines' skyrocketing expenses. Reasons: (1) rates have been increasing; (2) big jets and turboprops command high premiums. New type planes always do. With more than 150 jets due for delivery to U.S. carriers this year, insurance bills are hitting hard.

A look at 1959 gives a clue. Trunks and Pan American paid \$26,930,313 for domestic and international insurance, up 91% over 1958's \$14,096,078. And 1957 totaled only \$11,539,000.

Insurance on DC-8s and 707s alone cost \$8,130,721 last year. Electras added \$1,896,400. Thus, these planes accounted for \$10,027,121 of the \$26.9 million total, or 37.2%. And a number of carriers either operated this equipment for only a fraction of the year or hadn't yet inaugurated service. An idea of 1959 usage can be gained from columns in the table showing "aircraft days assigned to service" for the three planes.

The above insurance figures are the amounts entered in CAB accounts under flying operations expenses. Although

the accounts are labeled "public liability and property damage," they include much more: fire, windstorm, loss, damage, public liability and property damage "and all other general insurance carried by the . . . carrier except . . . liability for injuries, loss and damage to passengers and property and . . . for . . . welfare of employes." Thus, a large part of the total would be hull insurance. In comparing 1958 and 1959, it is also obvious that in the former year some lines had profit-sharing or other adjustments.

Some airlines have turned to self-insurance to keep costs down. American's 1959 total of \$5.3 million included \$1.4 million self-insurance. United and Pan Am have \$5 million self-insurance, National \$255,000.

Biggest 1959 bills were paid by biggest jet operators: American, TWA and Pan Am, in that order. Of AA's total, 53% was for 707s.

Also jumping is traffic liability insurance (injuries, loss and damage to passengers and cargo). Last year's total: \$11,660,877, up 61.1% over 1958. Reasons: larger-capacity planes, higher rates. Comparison of individual carrier payments may not be valid in this insurance category because of differing internal accounting procedures.

Breakdown of Insurance Costs, 1958 vs. 1959

	Public Liability & Prop. Damage—Total		Amount Spent for Turbines		Aircraft Electra	Days 707	Days DC-8	Days Operated Electra	Traffic Liability ^b	
	1958	1959	B-707	DC-8					1958	1959
AMERICAN	\$ 175,114	\$ 5,355,215*	\$ 2,848,824	.....	\$ 647,291	4,992	.....	5,396	\$ 476,108	\$ 1,749,295
BRANIFF	577,531	747,051	8,930	.....	129,687	13	.....	930	189,591	290,197
CAPITAL	820,149	961,388	.....	.....	.....	.....	.....	.....	336,689	398,397
CONTINENTAL ..	514,019	1,152,744	500,352	.....	.....	719	.....	.....	206,764	450,255
DELTA	834,007	1,157,430	.....	\$ 291,257	.....	.....	372	.....	259,556	413,036
EASTERN	2,489,701	3,091,207	.....	984	729,448 ^c	.....	.....	11,161	1,097,849	1,334,707
NATIONAL	520,892*	647,476*	77,915	.....	248,087	339	.....	1,428	257,957	424,582
NORTHEAST	625,989	868,921	10,515	.....	.....	13	.....	.....	290,605	458,126
NORTHWEST	835,743	1,019,738	.....	.....	46,646	.....	.....	691	398,679	601,857
TWA	1,363,170	4,750,314	1,801,589	.....	.....	3,396	.....	.....	597,467	2,131,485
UNITED	1,197,007*	1,872,103*	.....	744,966	.....	.....	663	.....	1,800,949	1,569,289
WESTERN	528,989	585,581	.....	.....	95,241	.....	.....	673	146,228	413,011
PAN AM-ATL ...	1,691,713	2,680,210*	1,557,207*	.....	.....	2,286	.....	.....	447,722	545,583
LAT. AM.	1,142,596	1,113,261*	90,454	.....	.....	150	.....	.....	417,330	475,742
PACIFIC	743,348	910,025*	197,728	.....	.....	387	.....	.....	295,510	395,447
ALASKA	36,110	17,649*	.....	.....	.....	.....	.....	.....	15,736	9,868
TOTAL	\$14,096,078	\$26,930,313	\$ 7,093,514	\$ 1,037,207	\$ 1,896,400	12,295	1,035	20,279	\$7,234,740	\$11,660,877

* Includes self insurance.

^a Eastern in 1958 spent \$29,903 on Electra insurance.

^b PAA-Atlantic in 1958 spent \$104,960 on 707 insurance.

^c Not included in total column for PL and PD.

1959 Airline Executive Salaries

AMERICAN AIRLINES, INC.

OFFICERS: C. R. Smith, pres. & dir., \$83,400 salary, 25,000 shares; Wm. J. Hogan, exec. v.p.-fin. & plan, dir., \$68,683 salary, no shares; O. M. Mosier, exec. v.p.-industry planning, dir., \$68,683 salary, 3,000 shares; G. A. Spater, exec. v.p. & gen. counsel, \$38,333 salary, 500 shares; C. W. Jacob, sr. v.p.-pub. affairs & secy., \$63,777 salary, 4,000 shares; G. M. Sadler, v.p. & gen. mgr., \$29,988 salary, no shares; M. A. Brenner, v.p., \$20,823 salary, 155 shares; S. C. Dunlap, v.p., \$26,064 salary, 1,000 shares; R. L. Fitzpatrick, v.p., \$28,026 salary, no shares; L. E. Glasgow, v.p. & controller, \$40,782 salary, 600 shares; R. A. Goebel, v.p., \$32,298 salary, no shares; P. W. Kayser, v.p., \$42,317 salary, 400 shares; M. D. Kochman, v.p., \$30,625 salary, no shares; Wm. Littlewood, v.p., \$34,341 salary, 1,930 shares; F. J. Mullins, v.p., \$22,322 salary, 400 shares; W. Player, v.p., \$39,247 salary, 400 shares; N. L. Smith, v.p., \$29,436 salary, 10 shares; C. R. Spears, v.p., \$52,173 salary, 3,200 shares; C. H. Startup, v.p., \$21,194 salary, no shares; D. D. Taylor, v.p., \$22,986 salary, no shares; E. C. Taylor, v.p., \$34,341 salary, 100 shares; W. B. Whitemore, v.p., \$28,189 salary, 350 shares; F. G. Wiser, v.p., \$32,681 salary, 350 shares; P. G. Larie, treas., \$23,548 salary, no shares; M. G. Beard, asst. v.p., \$24,194 salary, 2,500 shares; W. W. Branwell, asst. v.p., \$31,382 salary, no shares; A. D. Pasquale, asst. v.p., \$25,272 salary, no shares; J. V. Doohey, asst. v.p., \$22,614 salary, no shares; W. B. Hickman, asst. v.p., \$23,421 salary, no shares; T. F. Holden, asst. v.p., \$19,228 salary, no shares; J. D. Hungerford, asst. v.p., \$24,035 salary, 550 shares; J. K. Kilcarr, asst. v.p. & asst. treas., \$17,391 salary, no shares; R. F. Lambert, asst. v.p., \$16,861 salary, 300 shares; W. C. Lawrence, asst. v.p., \$26,228 salary, 680 shares; V. J. Long, asst. v.p., \$22,614 salary, 200 shares; A. J. Moccia, asst. v.p. & asst. treas., \$23,360 salary, no shares; D. P. O'Donoghue, asst. v.p., \$27,500 salary, no shares; C. N. Ourslar, asst. v.p., \$29,114 salary, 200 shares; W. F. Prigge, asst. v.p., \$17,819 salary, 150 shares; H. D. Reynolds, asst. v.p., \$25,000 salary, 100 shares; M. W. Shipley, asst. v.p., \$23,226 salary, 400 shares; A. E. Smick, asst. v.p., \$23,000 salary, 40 shares; W. G. Whitman, asst. v.p., \$24,614 salary, 410 shares; R. B. Wyland, asst. v.p., \$20,218 salary, no shares; W. J. Corbett, asst. controller, \$19,421 salary, no shares; J. T. Slavin, asst. treas., \$8,826 salary, no shares; A. A. Paradis, asst. secy., \$18,114 salary, no shares; A. R. Bone, regional v.p., \$34,035 salary, 2,000 shares; W. N. Bump, regional v.p., \$34,035 salary, 800 shares; S. G. King, regional v.p., \$29,035 salary, 2,000 shares; H. J. Lyall, regional v.p., \$24,035 salary, 600 shares.

BRANIFF AIRWAYS

OFFICERS: Chas. E. Beard, pres., \$72,000 salary, \$5,265 bonus, \$6,526 expenses, 21,600 shares; J. W. Miller, exec. vice pres., \$46,000 salary, \$1,385 expenses, 1,206 shares; C. G. Adams, v.p.-finance & secy., \$33,000 salary, \$1,553 expenses, 6,759 shares; R. C. Shrader, v.p., \$18,000 salary, \$1,215 bonus, \$61 expenses, 1,200 shares; R. V. Carlton, v.p.-op., \$36,700 salary, \$2,633 bonus, \$905 expenses, 4,000 shares; Rex Brock, v.p.-traffic & sales, \$28,500 salary, \$2,003 bonus, \$3,739 expenses, 300 shares; Malcolm Harrison, v.p.-industrial relations, \$23,000 salary, \$1,590 bonus, \$451 expenses, no shares; Walter Henshel, v.p.-public relations, \$21,500 salary, \$1,478 bonus, \$1,178 expenses, no shares; V. R. Kropff, asst. v.p., \$13,200 salary, \$855 bonus, \$1,824 expenses, no shares; O. W. Crane, treas., \$15,450 salary, \$1,024 bonus, \$491 expenses, 213 shares; R. L. Barrier, asst. treas., budget dir., \$12,450 salary, \$799 bonus, \$134 expenses, no shares; F. J. Beisecker, asst. treas., \$12,450 salary, \$799 bonus, \$64 expenses, no shares; Loyd Eden, asst. treas., \$12,450 salary, \$799 bonus, \$319 expenses, no shares; Velta Bowware, asst. secy., \$15,100 salary, \$248 bonus, no shares; T. P. Robertson, asst. v.p.-research & statistics, \$11,700 salary, \$743 bonus, \$1,553 expenses, no shares; Horace Bolding, v.p.-purchasing & stores, \$17,250 salary, \$1,159 bonus, \$218 expenses, 4 shares; Charles S. South, v.p., \$20,000 salary, \$1,365 bonus, \$6,428 expenses, no shares.

CAPITAL AIRLINES

OFFICERS: David H. Baker, pres. & dir., \$60,000 salary, \$4,616.00 expenses, 300 shares; Raymond G. Liochel, sr. v.p. & treas., \$34,499.94 salary, \$2,504.00 expenses, 4,000 shares; Walter H. Johnson, Jr., sr. v.p. & dir., \$40,000.08 salary, \$2,957.00 expenses, 100 shares; James B. Franklin, sr. v.p., \$30,699.96 salary, \$1,677.00 expenses, 850 shares; Marvin Whitlock, sr. v.p., \$19,712.17 salary, \$1,678.00 expenses, no shares; Robert J. Wilson, v.p., \$26,218.80 salary, \$3,734.00 expenses, 198 shares; Hayes Dever, v.p., \$20,712.42 salary, \$3,914.00 expenses, 1,900 shares; Read Q. Chalfant, v.p., \$17,500.08 salary, \$3,204.00 expenses, 103 shares; G. Ward Hobbs, v.p., \$22,500.00 salary, \$2,952.00 expenses, no shares; John H. Mahoney, v.p., \$4,999.90 salary, no shares; R.

W. Hardesty, v.p., \$19,556.08 salary, \$904.00 expenses, 100 shares; S. T. McAlister, asst. v.p., \$15,650.00 salary, \$1,309.60 expenses, no shares; A. H. Norling, asst. v.p., \$16,330.08 salary, \$1,322.57 expenses, no shares; S. B. Goldthorpe, asst. v.p. & compt., \$16,041.74 salary, \$951.90 expenses, no shares; Althea Gould, asst. v.p., \$14,000.36 salary, \$1,917.72 expenses, 36 shares; Earl Raymond, asst. v.p., \$15,397.92 salary, \$627.63 expenses, no shares; Waller B. Smith, asst. secy., \$10,537.50 salary, \$5,239.39 expenses, no shares; R. P. Wright, asst. treas., \$16,200.00 salary, \$146.04 expenses, 300 shares; O'Farrell Estes, asst. treas., \$15,000.00 salary, \$707.16 expenses, no shares.

CONTINENTAL AIR LINES

OFFICERS: R. F. Six, pres. & dir., \$61,667 salary, \$27,590 expenses, 5,250 shares; H. C. Lawrence, exec. v.p. & dir., \$26,613 salary, \$2,309 expenses, 210 shares; A. Damm, v.p.-financ., \$18,477 salary, \$1,290 expenses, no shares; H. W. Bell, v.p.-personnel, \$14,280 salary, \$3,495 expenses, 161 shares; C. H. Calhoun, v.p.-eng. & maint., \$19,647 salary, \$1,977 expenses, 210 shares; M. L. Davis, v.p.-sales, \$17,833 salary, \$2,042 expenses, no shares; L. H. Dennis, v.p.-pass. service, \$19,647 salary, \$2,476 expenses, 948 shares; S. O. Helberg, v.p.-publ. rel. & adv., \$5,438 salary, \$230 expenses, 1,155 shares; D. R. Haeter, v.p.-oper., \$26,333 salary, \$3,743 expenses, 2,166 shares; M. Kramer, v.p.-publ. affairs, \$14,667 salary, \$5,441 expenses, 1,575 shares; S. B. Redmond, v.p.-reg. proceedings, \$15,907 salary, \$4,171 expenses, 1,243 shares; J. A. Uhl, dir. & v.p., \$12,833 salary, \$200 bonus, \$1,750 expenses, 5,375 shares; C. F. Whelan, v.p.-econ. plan. & sales, \$17,767 salary, \$1,766 expenses, no shares; H. H. Cady, v.p. & treas., \$12,773 salary, \$787 expenses, no shares; F. G. Colnar, asst. v.p. & budget dir., \$11,340 salary, \$3,086 expenses, 63 shares; G. J. M. Kelly, secy., \$11,041 salary, \$1,109 expenses, 855 shares; P. F. Kriethe, Jr., secy., \$11,903 salary, \$621 expenses, 5 shares; E. R. Ranes, v.p.-customer service, \$14,430 salary, \$3,663 expenses, no shares; R. G. Schorling, asst. v.p.-purch. & prop., \$13,177 salary, \$1,893 expenses, 168 shares; D. R. Wilson, asst. v.p.-oper., \$15,893 salary, \$2,009 expenses, no shares.

DELTA AIR LINES, INC.

OFFICERS: C. E. Woolman, pres.-gen. mgr., \$67,583 salary, \$2,215 expenses, 41,196 shares; Todd G. Cole, exec. v.p.-adm. & asst. secy., \$40,300 salary, \$1,294 expenses, 841 shares; Chas. H. Dolson, exec. v.p.-oper., \$40,300 salary, \$900 expenses, 1,625 shares; Laigh C. Parker, sr. v.p. & asst. to pres., \$40,300 salary, \$1,191 expenses, 1,875 shares; R. S. Maurer, v.p.-legal, \$25,200 salary, \$2,719 expenses, 103 shares; W. T. Beobe, v.p.-personnel, \$25,108 salary, \$6,000 expenses, 187 shares; Eric Cocke, Jr., v.p.-civil affairs, \$19,987 salary, \$3,455 expenses, 1,700 shares; T. M. Miller, v.p.-traffic & sales-adm., \$24,320 salary, \$2,301 expenses, 55 shares; Robert L. Griffith, v.p., \$20,802 salary, \$3,429 expenses, 100 shares; Robert Oppenlander, compt., \$20,641 salary, \$263 expenses, no shares; R. H. Wharton, Jr., asst. v.p.-personnel, \$16,268 salary, \$401 expenses, 250 shares; C. H. McHenry, secy. & treas., \$1,360 salary, \$1,146 expenses, 1,875 shares; Catherine Fitzgerald, asst. treas., \$17,700 salary, \$12,667 expenses, no shares; J. R. Howell, asst. treas., \$12,667 salary, \$131 expenses, no shares; C. B. Wilder, asst. v.p.-oper. technical, \$19,102 salary, \$104 expenses, 150 shares; Paul W. Pete, asst. v.p.-properties, \$14,082 salary, \$3,382 expenses, 100 shares; Chas. P. Knecht, asst. v.p.-sales, \$15,201 salary, \$578 expenses, 272 shares.

EASTERN AIR LINES, INC.

OFFICERS: M. A. MacIntyre, pres. & dir., \$20,000 salary, \$300 fee, \$585 expenses, no shares; T. F. Armstrong, exec. v.p. & dir., \$35,000 salary, \$1,100 expenses, \$2,678 expenses, 7,723 shares; S. L. Shannon, sr. v.p. & dir., \$20,000 salary, \$700 fee, \$1,615 expenses, 5,747 shares; T. E. Creighton, treas. & dir., \$17,500 salary, \$1,000 fee, \$632 expenses, 5,370 shares; L. P. Arnold, v.p., \$22,500 salary, \$2,606 expenses, 4,981 shares; M. M. Frost, v.p., \$27,500 salary, \$5,555 expenses, 2,599 shares; Wm. VanDusen, v.p., \$25,000 salary, \$3,711 expenses, 3,251 shares; Charles Froesch, v.p., \$20,000 salary, \$2,301 expenses, 2,597 shares; J. H. Brock, v.p., \$20,834 salary, \$3,323 expenses, 2,221 shares; Robert Ramspeck, v.p., \$20,000 salary, \$1,048 expenses, 754 shares; W. L. Morissette, Jr., v.p., \$21,667 salary, \$4,393 expenses, 446 shares; J. H. Halliburton, v.p., \$25,625 salary, \$1,280 expenses, 686 shares; B. T. Dykes, v.p., \$29,600 salary, \$672 expenses, 918 shares; A. L. Chabot, asst. v.p., \$20,834 salary, \$4,822 expenses, 1,047 shares; G. A. Smith, second v.p., \$20,834 salary, \$2,705 expenses, 3,266 shares; R. S. Lipp, secy., \$11,000 salary, \$1,055 expenses, 495 shares; P. L. Foster, asst. v.p., \$10,459 salary, \$277 expenses, 199 shares; M. Lethbridge, asst. v.p., \$15,000 salary, \$1,209 expenses, 542 shares;

M. B. Westphal, asst. v.p., \$16,200 salary, \$2,721 expenses, 155 shares; Frank Sharpe, asst. v.p., \$16,200 salary, \$1,942 expenses, 815 shares; D. C. McRae, asst. v.p., \$14,200 salary, \$1,056 expenses, 727 shares; F. E. Williams, asst. v.p., \$11,400 salary, \$2,628 expenses, 370 shares; M. O. Byrd, asst. v.p., \$12,400 salary, \$2,549 expenses, 54 shares; Graydon Hall, asst. v.p., \$13,555 salary, \$1,537 expenses, 1 share; E. L. Williams, asst. v.p., \$11,000 salary, \$5,226 expenses, 218 shares; D. L. Sinkler, asst. v.p., \$12,200 salary, \$3,607 expenses, 558 shares; H. W. Cutshall, asst. v.p., \$11,025 salary, \$3,745 expenses, 212 shares; J. T. Hoffman, Jr., asst. v.p., \$14,485 salary, \$1,104 expenses, 115 shares; A. F. Tirrell, asst. v.p., \$11,000 salary, \$2,974 expenses, 191 shares; J. E. Reinke, asst. v.p., \$14,000 salary, \$4,127 expenses, 101 shares; H. C. Dobbs, asst. v.p., \$12,000 salary, \$1,817 expenses, 289 shares; R. E. Baskind, asst. v.p., \$12,600 salary, \$2,745 expenses, 168 shares; F. A. Bennett, asst. v.p., \$10,000 salary, \$789 expenses, 224 shares; G. W. Channell, asst. v.p., \$13,875 salary, \$1,870 expenses, 51 shares; C. A. Glover, asst. v.p., \$9,375 salary, \$2,565 expenses, 240 shares; Beverly Griffith, asst. v.p., \$8,400 salary, \$1,943 expenses, 500 shares; J. A. Hamill, asst. v.p., \$9,300 salary, \$838 expenses, 240 shares; Harrison Knapp, asst. v.p., \$12,000 salary, \$1,687 expenses, 348 shares; W. T. Raymond, asst. v.p., \$15,000 salary, \$4,184 expenses, 274 shares; T. A. Sundem, asst. v.p., \$11,800 salary, \$3,325 expenses, 31 shares; E. E. Hahn, asst. treas., \$11,800 salary, \$1,241 expenses, 174 shares; C. J. Simons, asst. treas., \$11,500 salary, \$2,310 expenses, 329 shares; J. C. Warlick, asst. secy., \$10,000 salary, \$1,027 expenses, 512 shares; C. A. Wallen, asst. secy., \$11,000 salary, \$1,030 expenses, 300 shares.

NATIONAL AIRLINES

OFFICERS: G. T. Baker, pres. & dir., \$54,000 salary, \$4,476 bonus, \$8,697 expenses, 199,479 shares; J. C. Bassage, v.p., \$3,333 salary, no shares; J. C. Browner, exec. v.p. & dir., \$27,000 salary, \$7,866 bonus, \$898 expenses, 3,980 shares; W. B. Caldwell, Jr., asst. treas., \$12,000 salary, \$3,933 bonus, \$2,208 expenses, 72 shares; J. W. Colthar, asst. v.p., \$11,875 salary, \$1,434 bonus, \$154 expenses, no shares; H. D. Drake, asst. treas., \$6,000 salary, \$2,523 bonus, \$85 expenses, no shares; L. W. Dymond, v.p., \$22,000 salary, \$6,555 bonus, \$697 expenses, 621 shares; R. A. Fitzgerald, v.p., \$15,000 salary, \$4,916 bonus, \$1,432 expenses, 130 shares; R. P. Foreman, asst. v.p., \$15,000 salary, \$4,916 bonus, \$1,861 expenses, 4,748 shares; R. S. Grant, asst. v.p., \$15,000 salary, \$4,916 bonus, \$258 expenses, 96 shares; A. G. Hardy, sr. v.p., \$24,000 salary, \$7,866 bonus, \$3,486 expenses, 2,596 shares; W. F. Johnston, v.p., \$17,000 salary, \$5,080 bonus, \$460 expenses, 2,933 shares; John L. Morris, v.p., \$15,458 salary, \$4,916 bonus, \$6,224 expenses, 3,727 shares; G. W. Paul, asst. v.p., \$12,000 salary, \$3,933 bonus, \$462 expenses, 3 shares; W. A. Perry, asst. v.p., \$9,000 salary, \$3,933 bonus, \$1,012 expenses, no shares; J. M. Rosenthal, sr. v.p., \$24,000 salary, \$7,866 bonus, \$885 expenses, 2,754 shares; C. F. Sharp, v.p., \$16,500 salary, \$4,916 bonus, \$1,163 expenses, 1,227 shares; A. L. Stanley, asst. v.p., \$1,725 salary, no shares; Walter Sternberg, sr. v.p., \$24,000 salary, \$7,866 bonus, \$4,388 expenses, no shares; H. B. Taylor, asst. treas., \$10,000 salary, \$1,200 bonus, \$614 expenses, no shares; R. E. Wieland, v.p., \$16,500 salary, \$4,916 bonus, \$2,189 expenses, 4,006 shares; W. C. Bruner, asst. v.p., \$11,875 salary, \$2,798 bonus, \$18 expenses, no shares.

NORTHEAST AIRLINES

OFFICERS: James W. Austin, pres., \$36,000 salary, \$2,616 expenses, no shares; Joel S. Daniels, asst. v.p.-prom. & adv., \$14,400 salary, \$3,280 expenses, 200 shares; Nelson B. Fry, v.p.-irf. & sales, \$20,000 salary, \$3,065 expenses, 300 shares; George E. Gardner, chr. of board, asst. to board, \$25,326 salary, \$3,530 expenses, 100 shares; Thomas L. Grace, v.p.-ops., \$17,532 salary, \$823 expenses, no shares; Hamilton Hard, v.p.-adm., \$15,000 salary, \$207 expenses, no shares; Robert H. Kerr, v.p.-personnel, \$15,000 salary, \$456 expenses, no shares; Alfred A. Lane, v.p.-ops., \$18,738 salary, \$1,759 expenses, no shares; Rembrandt P. Lane, Jr., treas. & v.p.-fin., \$19,000 salary, \$684 expenses, no shares; D. W. H. MacKinnon, v.p.-eng. & mt., \$20,304 salary, \$28 expenses, no shares; Wheaton W. Miles, asst. v.p.-prod., \$12,000 salary, \$128 expenses, 100 shares; Magruder W. Offutt, III, asst. v.p.-gen. m., \$12,000 salary, \$7,060 expenses, no shares; Edmund O. Schroeder, v.p.-tech. serv., \$18,345 salary, 200 shares; Alfred S. Walker, Jr., v.p.-g.m. ops., \$14,400 salary, \$499 expenses, no shares; Harry F. Zimmerman, asst. treas., \$14,000 salary, \$19 expenses, no shares.

NORTHWEST AIRLINES, INC.

OFFICERS: Donald W. Nyrop, dir. & pres., \$75,000 salary, \$6,523 expenses, 14,900 shares; Gordon M. Bain, v.p.-sales, \$32,500 salary, \$2,437 expenses, 1,200

shares; **Paul L. Benscoter**, v.p.-Orient Region, \$19,700 salary, \$4,103 expenses, 1,900 shares; **William J. Eiden**, treas., \$26,500 salary, \$2,736 expenses, 4 shares; **A. E. Flan**, v.p. & secy., \$22,000 salary, \$963 expenses, 405 shares; **Frank C. Judd**, v.p.-mainf. & station oper., \$31,500 salary, \$2,070 expenses, 1,205 shares; **C. L. Stewart**, v.p.-plans, \$18,500 salary, \$6,567 expenses, 500 shares; **A. D. Pieppras**, asst. compt., \$13,500 salary, \$753 expenses, 200 shares; **D. H. Hardesty**, asst. treas., \$14,000 salary, \$250 expenses, 710 shares; **F. J. Scott**, asst. secy., \$12,375 salary, \$106 expenses, no shares; **Dale Merrick**, asst. v.p.-properties, \$14,250 salary, \$503 expenses, 700 shares; **Linus C. Glotzbach**, v.p.-personnel, \$11,458 salary, \$171 expenses, no shares; **Philip T. Drotning**, v.p.-pub. rel., \$19,500 salary, \$13,208 expenses, no shares.

PAN AMERICAN-GRAVE AIRWAYS

OFFICERS: **Andrew B. Shea**, pres. & dir., \$1,634 expenses; **Erwin Balluder**, v.p. & dir., no shares; **Edward L. Farrell, Jr.**, v.p. & dir., \$1,347 expenses; **Douglas Campbell**, v.p. & gen. mgr., \$26,500 salary, \$4,300 bonus, \$4,149 expenses, no shares; **T. J. Kirkland**, v.p., \$26,500 salary, \$3,300 bonus, \$4,806 expenses, no shares; **L. H. Clinton**, v.p. & compt., \$22,500 salary, \$2,000 bonus, 2,965 expenses, no shares; **C. S. Collins**, v.p., \$19,500 salary, \$1,700 bonus, \$6,768 expenses, no shares; **J. T. Scholtz**, asst. v.p., \$18,500 salary, \$900 bonus, \$1,278 expenses, no shares; **Ramon deMurias**, asst. v.p., \$13,500 salary, \$600 bonus, \$4,258 expenses, no shares; **Roger V. Rose**, asst. v.p., \$3,424 expenses, no shares; **Gail M. Oxley**, secy., no shares; **J. S. Woodbridge**, treas., no shares; **H. Preston Morris**, asst. secy., no shares; **A. J. Phelan**, asst. compt., \$15,500 salary, \$650 bonus, \$1,365 expenses, no shares; **W. F. Lewis**, asst. treas., \$14,000 salary, \$400 bonus, \$1,666 expenses, no shares; **E. E. Spencer**, asst. treas., \$12,500 salary, \$400 bonus, \$4,608 expenses, no shares; **Henry J. Friendly**, dir., no shares; **W. L. Morrison**, dir., no shares; **F. E. Larkin**, dir., no shares; **Roger Lewis**, dir., no shares; **K. A. Lawder**, dir., no shares.

PAN AMERICAN WORLD AIRWAYS

OFFICERS: **J. T. Tripp**, pres. & dir., \$100,000 salary, \$2,350 fee, \$6,379 expenses, no shares; **Roger Lewis**, exec. v.p., admin. dir., \$40,000 salary, \$30,000 bonus, \$1,300 fee, \$7,323 expenses, 2,075 shares; **W. L. Morrison**, exec. v.p.-LAD, \$40,000 salary, \$27,000 bonus, \$12,782 expenses, 15,212 shares; **H. E. Gray**, exec. v.p.-OD, dir., \$40,000 salary, \$30,000 bonus, \$500 fee, \$4,458 expenses, 9,052 shares; **R. B. Murray, Jr.**, exec. v.p., \$35,000 salary, \$15,000 bonus, \$18,586 expenses, 375 shares; **J. G. Leslie**, v.p. & asst. to pres. dir., \$38,000 salary, \$25,000 bonus, \$1,100 fee, \$7,669 expenses, no shares; **H. J. Friendly**, v.p. & gen. counsel, dir., \$27,750 salary, \$500 fee, \$600 expenses, 10,710 shares; **H. A. Schneider**, v.p. & gen. counsel, dir., \$2,750 salary, \$2,000 bonus, \$100 fee, \$142 expenses, 50 shares; **S. F. Pryor**, v.p. & dir., \$33,000 salary, \$15,000 bonus, \$2,250 fee, \$51,453 expenses, 15,432 shares; **F. Gledhill**, v.p. & dir., \$38,000 salary, \$26,000 bonus, \$1,300 fee, \$7,920 expenses, 5,202 shares; **W. G. Lipscomb**, v.p.-traffic & sales, \$38,000 salary, \$26,000 bonus, \$10,322 expenses, 11,908 shares; **J. B. Gates**, v.p.-development, \$33,000 salary, \$14,000 bonus, \$3,018 expenses, 1,000 shares; **A. P. Adams**, v.p., \$32,000 salary, \$15,000 bonus, \$13,307 expenses, 2,500 shares; **Edwin Balluder**, v.p., \$30,000 salary, \$10,000 bonus, \$4,072 expenses, 1,625 shares; **J. C. Pirie**, v.p. & assoc. gen. counsel, \$26,500 salary, \$10,000 bonus, \$2,034 expenses, 2,380 shares; **C. M. Young**, v.p., \$1,458 salary, \$905 expenses, 3,025 shares; **R. B. Adams**, v.p., \$30,000 salary, \$12,000 bonus, \$9,585 expenses, 3,040 shares; **A. Jackson Kelly**, v.p., \$22,488 salary, \$5,000 bonus, \$5,301 expenses, 1,158 shares; **H. W. Toomey**, v.p., \$20,000 salary, \$8,793 expenses, no shares; **N. P. Blake**, v.p., \$21,000 salary, \$5,000 bonus, \$5,218 expenses, 1,323 shares; **H. H. Berke**, v.p.-SOS, \$28,000 salary, \$14,000 bonus, \$3,480 expenses, 3,125 shares; **E. M. Goulder**, v.p.-indust. rel., \$24,000 salary, \$8,000 bonus, \$8,245 expenses, 750 shares; **R. S. Mitchell**, v.p.-GMRD, \$29,000 salary, \$12,000 bonus, \$11,929 expenses, 2,172 shares; **R. G. Ferguson**, treas., \$30,000 salary, \$15,000 bonus, \$4,298 expenses, 5,574 shares; **J. S. Woodbridge**, compt., \$30,000 salary, \$15,000 bonus, \$1,721 expenses, 1,750 shares; **H. P. Morris**, secy. & gen. attorney, \$15,000 salary, \$4,500 bonus, \$129 expenses, 2,875 shares; **S. B. Kauffman**, est. v.p.-eng., \$23,000 salary, \$9,000 bonus, \$4,665 expenses, 750 shares; **W. W. Lynch**, asst. v.p.-comm., \$30,000 salary, \$6,000 bonus, \$4,750 expenses, 2,387 shares; **J. C. Cone**, ass't-v.p., \$18,000 salary, \$7,000 bonus, \$31,811 expenses, 5,439 shares; **W. J. McEvoy**, ass't-v.p., \$15,000 salary, \$3,250 bonus, \$13,327 expenses, 3,658 shares; **R. E. Smith**, ass't-v.p., \$22,500 salary, \$4,000 bonus, \$12,336 expenses, 506 shares; **H. M. Blackwell**, ass't-v.p.-SOS, \$17,500 salary, \$3,000 bonus, \$1,887 expenses, 202 shares; **R. S. Hoogeland**, ass't-v.p., \$7,000 salary, \$4,000 bonus, \$1,468 expenses, 500 shares; **R. P. Monson**, ass't. treas., \$20,000 salary, \$9,000 bonus, \$2,691 expenses, 1,159 shares; **J. E. McGuire**, ass't. compt., \$17,000 salary, \$4,000 bonus, \$5,634 expenses, 152 shares; **E. G. Rothrock**, ass't. secy., \$3,500 salary, \$2,000 bonus, \$3,646 expenses, no shares; **J. J. Canfield**, ass't. secy., \$10,300 salary, \$750 bonus, \$389 expenses, 94 shares; **J. Macy, Jr.**, ass't. secy., \$14,500 salary, \$2,000 bonus, \$161 expenses, no shares.

Continued on page 49



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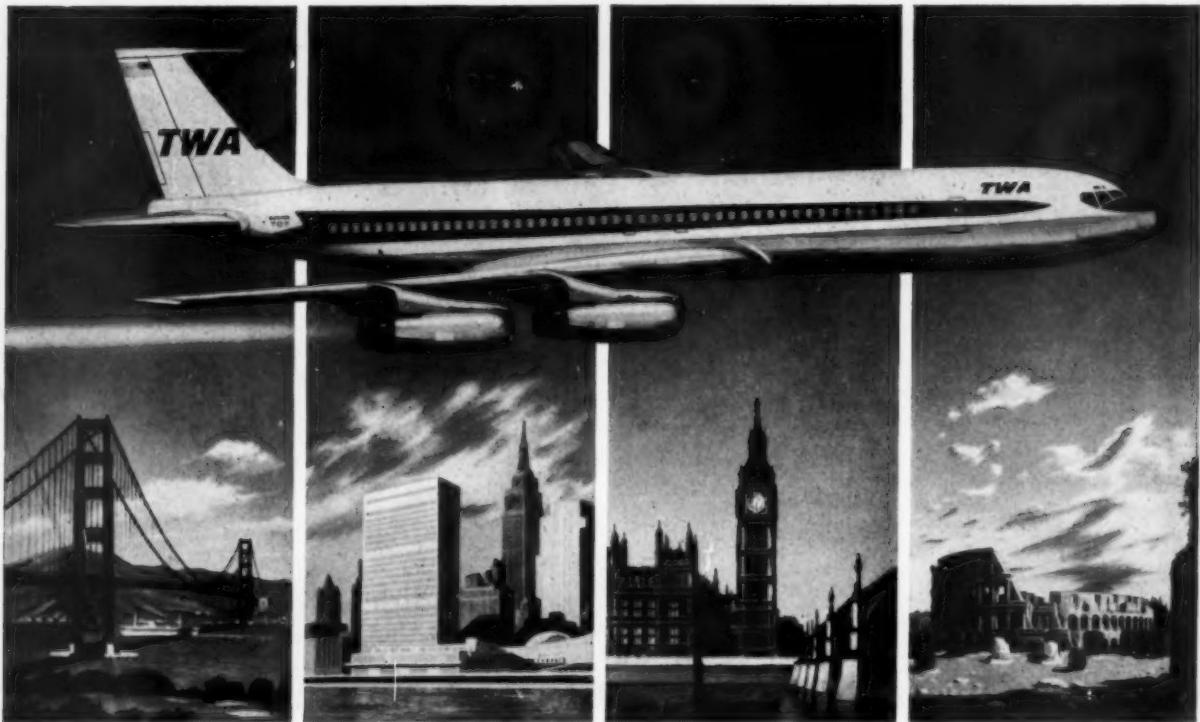
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TRANS WORLD AIRLINES

OFFICERS: Warren Lee Pierson, chairman of the board, dir., \$64,821 salary, \$9,037 expenses, 200 shares; Charles S. Thomas, pres. & dir., \$64,821 salary, \$26,428 expenses, 500 shares; E. O. Cocke, sr. v.p., system general manager, & dir., \$44,765 salary, \$5,000 bonus, \$8,605 expenses, 1,100 shares; A. V. Leslie, sr. v.p.-finance, treas. & dir., \$44,761 salary, \$4,000 bonus, \$5,047 expenses, 90 shares; J. R. Barch, asst. v.p.-industry sales affairs, \$17,487 salary, \$1,000 bonus, \$2,525 expenses, no shares; E. W. Barker, asst. secy., \$15,796 salary, \$500 bonus, \$178 expenses, no shares; F. G. Betts, v.p.-purchasing, \$24,668 salary, \$1,000 bonus, \$1,004 expenses, 107 shares; A. J. Brough, asst. v.p.-prop. & facilities, \$3,020 salary, \$842 expenses, no shares; E. P. Burke, asst. v.p. & exec. asst. to system gen. manager, \$20,347 salary, \$2,500 bonus, \$868 expenses, 30 shares; E. E. Busch, v.p.-equipment refinement, \$30,915 salary, \$1,000 bonus, \$5,529 expenses, no shares; J. H. Clemson, v.p., \$27,559 salary, \$411 expenses, no shares; P. G. Desautels, v.p.-national accounts, \$24,931 salary, \$1,000 bonus, \$4,648 expenses, 254 shares; R. Duckworth, corp. secy., \$17,339 salary, \$1,000 bonus, \$3,323 expenses, no shares; R. M. Dunn, v.p.-tech. serv., \$28,096 salary, \$3,500 bonus, \$3,000 expenses, no shares; H. D. Fellows, asst. v.p.-schedule planning & market research, \$21,896 salary, \$2,000 bonus, \$590 expenses, no shares; C. S. Fullerton, v.p.-sales serv., \$26,404 salary, \$2,500 bonus, \$6,291 expenses, no shares; G. L. Gilmore, v.p.-pub. rel., \$24,874 salary, \$2,500 bonus, \$4,878 expenses, 270 shares; J. Greenwald, asst. v.p.-passenger serv., \$21,238 salary, \$2,000 bonus, \$2,981 expenses, no shares; F. D. Hall, v.p. & gen. transportation manager, \$28,900 salary, \$3,500 bonus, \$6,544 expenses, no shares; J. D. Harrigan, v.p.-regional sales, \$20,456 salary, \$2,000 bonus, \$6,035 expenses, no shares; S. L. Higginbottom, asst. v.p.-eng. flight test & inspection, \$19,927 salary, \$2,000 bonus, \$452 expenses, no shares; A. E. Jordan, asst. v.p.-maint. & eng., \$20,306 salary, \$2,500 bonus, \$477 expenses, no shares; J. W. Leitzkus, v.p.-regional sales, \$27,424 salary, \$1,750 bonus, \$14,367 expenses, 400 shares; J. T. Logan, asst. v.p.-scheduling, \$17,628 salary, \$2,000 bonus, \$266 expenses, 2 shares; L. P. Marechal, v.p. & gen. sales manager, \$23,304 salary, \$3,500 bonus, \$7,608 expenses, no shares; J. N. Martin, v.p.-regional sales, \$23,247 salary, \$1,750 bonus, \$3,906 expenses, no shares; R. Mazzarini, v.p.-int'l sales development, \$23,224 salary, \$1,000 bonus, \$6,896 expenses, 100 shares; C. E. McCollum, v.p., \$19,267 salary, \$647 expenses, 198 shares; J. P. Mead, asst. v.p.-industrial rel., \$22,575 salary, \$2,000 bonus, \$858 expenses, no shares; R. E. Montgomery, v.p.-regional sales, \$26,349 salary, \$2,000 bonus, \$9,049 expenses, no shares; R. B. Mueller, asst. v.p.-flight operations, \$27,001 salary, \$2,000 bonus, \$715 expenses, no shares; W. E. Rooker, asst. treas., \$20,369 salary, \$1,250 bonus, \$300 expenses, no shares; R. K. Rourke, asst. v.p.-equipment planning & development, \$21,538 salary, \$2,000 bonus, \$2,414 expenses, no shares; R. W. Bummel, v.p.-planning & research, \$28,022 salary, \$3,500 bonus, \$10,099 expenses, no shares; T. K. Taylor, v.p., \$28,212 salary, \$3,500 bonus, \$8,081 expenses, 36 shares; J. W. Thomas, v.p.-civic affairs, \$20,571 salary, \$1,000 bonus, \$4,932 expenses, no shares; W. L. Trimble, v.p.-regional transportation, \$33,662 salary, \$2,000 bonus, \$3,820 expenses, no shares.

UNITED AIR LINES, INC.

OFFICERS: W. A. Patterson, pres., \$100,000 salary, 10,980 shares; J. A. Herlihy, sr. v.p.-eng. & maint., \$55,000 salary, 2,558 shares; D. F. Magarrell, sr. v.p.-trans. services, \$55,000 salary, 2,032 shares; R. E. Johnson, sr. v.p.-sales & pub. rel., \$52,000 salary, 2,670 shares; D. R. Petty, sr. v.p.-flight oper., \$53,000 salary, 2,407 shares; Curtis Barkes, sr. v.p.-fin. & prop., \$52,000 salary, 4,999 shares; R. F. Ahrens, sr. v.p.-personnel, \$42,000 salary, 3,631 shares; H. E. Nourse, sr. v.p.-econ. controls, \$34,000 salary, 4,660 shares; C. F. McLean, v.p.-law, \$35,000 salary, 1,009 shares; S. P. Martin, sec. of corp., asst. to pres., \$22,000 salary, 1,293 shares; R. E. Bruno, compt. & asst. sec., \$26,500 salary, 251 shares; A. M. DeVosney, v.p. & treas., \$27,000 salary, 400 shares; W. P. Hoare, v.p.-maint., \$26,204 salary, no shares; G. E. Keck, v.p.-maint., \$25,750 salary, 355 shares; O. T. Larson, v.p.-grnd. services, \$30,000 salary, 395 shares; O. C. Enge, v.p.-psgr. service, \$25,000 salary, 511 shares; I. E. Sommermeyer, v.p.-flying, \$34,100 salary, 492 shares; J. M. Hodgson, v.p.-flight adminis., \$31,700 salary, no shares; B. B. Gragg, v.p.-marketing, \$29,400 salary, 849 shares; R. M. Ruddick, v.p. & asst. to pres., \$20,000 salary, 54 shares; J. E. Moore, v.p.-traffic, \$25,000 salary, 546 shares; W. C. Menzler, v.p.-eng., \$35,000 salary, 1,083 shares; H. J. Merchant, v.p.-sales mktg., \$26,500 salary, no shares; D. V. O'Leary, v.p.-purch. & stores, \$26,500 salary, 461 shares; D. C. Meanan, v.p.-facil. & prop., \$21,400 salary, 600 shares; C. M. Meier, v.p.-employee rel., \$26,000 salary, 141 shares; T. Lee, Jr., v.p.-edu. & trng., \$19,500 salary, no shares; L. F. Hampel, v.p.-bus. research, \$20,600 salary, 28 shares; W. E. Alberts, v.p.-indus. eng., \$21,200 salary, 144 shares.

WESTERN AIR LINES

OFFICERS: Terrell C. Drinkwater, pres. & dir., \$73,000 salary, \$16,892 expenses, 6,432 shares; Stanley

Continued on next page

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Puritan offers design, engineering, testing and manufacturing facilities for components in all phases of high altitude breathing systems. Puritan's state of the art results from being a pioneer in the development and manufacture of aviation oxygen equipment—a degree of know-how that is unsurpassed in the industry. On any problem concerning breathing systems and equipment, your inquiry would be welcome.

AEROSPACE DIVISION

B. Shatto, v. p.-oper. & dir., \$45,600 salary, \$1,289 expenses, 3,801 shares; Marvin W. Landes, v. p.-serv., \$36,000 salary, \$988 expenses, 1,600 shares; Arthur F. Kelly, v. p.-sales, \$36,000 salary, \$5,502 expenses, 3,273 shares; J. Judson Taylor, v. p. & treas., \$36,000 salary, \$1,295 expenses, 2,455 shares; D. P. Rende, v. p.-legal & secy., \$36,000 salary, \$5,394 expenses, 1,019 shares; Stanley Gewirtz, v. p.-admin., \$31,667 salary, \$11,459 expenses, no shares; G. G. Broder, v. p., \$28,000 salary, \$5,594 expenses, 1,396 shares; Charles J. J. Cox, contr. & asst. treas., \$28,000 salary, \$994 expenses, 1,337 shares; William C. Jennings, asst. secy., \$15,367 salary, \$305 expenses, no shares; John W. Simpson, asst. secy., \$15,367 salary, \$3,607 expenses, 25 shares.

ALLEGHENY AIRLINES, INC.

OFFICERS: L. O. Barnes, pres. & dir., \$29,250 salary, \$4,731 expenses, 23,900 shares; W. J. Short, v.p.-fin., \$17,950 salary, \$1,450 expenses, 250 shares; D. L. Miller, sr. v.p.-sales & dir., \$18,450 salary, \$2,500 expenses, 502 shares; R. G. Dinning, v.p.-flight & passenger service, \$16,500 salary, \$1,295 expenses, 400 shares; R. J. Masiello, v.p.-mainf. & eng., \$12,819 salary, \$2,397 expenses, no shares; E. I. Colodny, sec., \$13,500 salary, \$2,164 expenses, 100 shares; W. D. Hay, controller, \$10,000 salary, \$334 expenses, no shares; G. F. Gerth, treas., \$10,300 salary, \$409 expenses, 200 shares; V. F. Fountain, asst. secy., \$5,700 salary, \$73 expenses, no shares; L. H. Stenzel, II, asst. secy., \$29 expenses, no shares; E. K. Arnold, v.p. & secy., \$8,736 salary, \$597 expenses, no shares; J. S. Russell, Jr., asst. secy., no shares.

BONANZA AIR LINES, INC.

OFFICERS: Edmund Converse, chm. of bd. & pres., \$20,000 salary, \$1,166 expenses, 211,061 shares; G. Robert Henry, exec. v.p. & dir., \$17,834 salary, \$4,461 expenses, no shares; Myron W. Reynolds, v.p.-oper., \$17,625 salary, \$1,457 expenses, no shares; William J. Mitchell, v.p.-sales, \$13,217 salary, \$3,850 expenses, 100 shares; Robert J. Sherer, treas., \$13,217 salary, \$1,965 expenses, 200 shares; Ralston O. Hawkins, gen. counsel & secy., \$11,000 salary, \$878 expenses, no shares; Earl C. Jochim, asst. secy. & dir.-research & development, \$11,917 salary, \$809 expenses, no shares; William C. Burt, asst. secy., 1,400 shares; Thomas J. Van Bogert, asst. treas., \$6,084 salary, \$360 expenses, no shares; Frank W. Beer, dir., \$200 salary, 6,080 shares; Roger Converse, dir., 16,500 shares; Chester M. Glass, Jr., \$200 salary, 1,000 shares; William Pabst, \$200 salary, no shares; George L. Vargas,

\$200 salary, 8,770 shares; William T. Waggoner, Jr., 33,943 shares.

CENTRAL AIRLINES, INC.

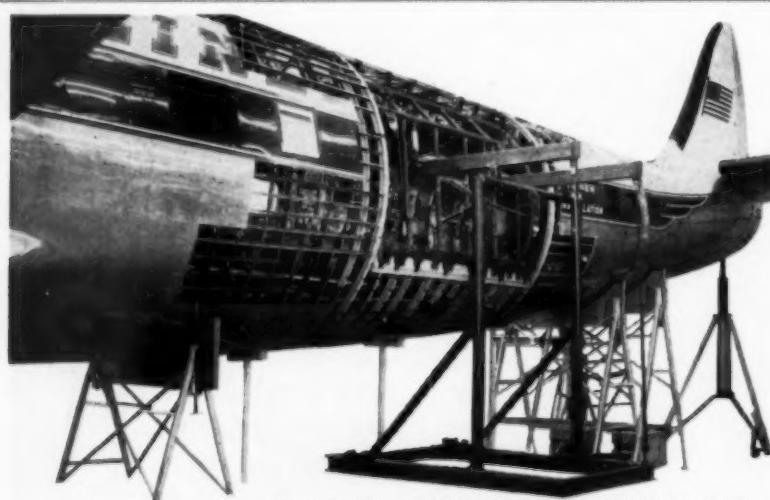
OFFICERS: Keith Kahle, pres., \$18,000 salary, \$5,870 expenses, 26,004 shares; F. E. Howe, exec. v.p. & treas., \$17,000 salary, \$974 expenses, 1,500 shares; R. L. Wageneck, v.p.-oper., \$16,000 salary, \$815 expenses, 500 shares; A. S. Aldridge, v.p.-traffic & sales, \$13,000 salary, \$1,560 expenses, 2,196 common shares, 8 preferred shares; C. E. Lundstrom, sec. & asst. treas., \$10,000 salary, \$414 expenses, \$53 shares; A. H. Pritchett, asst. sec., \$5,842 salary, \$5,242 expense, 400 shares; F. Kirk Johnson, chm. of bd., \$8,000 salary, \$10 expenses, 143,239 shares; P. Crawford, asst. sec., \$600 salary, no shares; W. Whitlock, chief pilot, \$13,258 salary, no shares.

FRONTIER AIRLINES

OFFICERS: L. B. Maytag, Jr., chm. of board, \$16,500 salary, \$2,069 expenses, 493,601 shares; C. A. Myhra, dir. & pres., \$14,732 salary, 20,100 shares; G. R. Woody, exec. v.p., \$18,333 salary, \$193 expenses, no shares; L. F. Blatter, v.p. & treas., \$13,462 salary, \$2,392 expenses, 80 shares; J. D. Brock, v.p., \$7,846 salary, \$646 expenses, no shares; J. D. Lindsay, v.p., \$7,511 salary, \$431 expenses, no shares; H. P. Barnard, Jr., v.p., \$13,375 salary, \$606 expenses, 225 shares; A. J. Love, dir. & secy., \$144 expenses, 122 shares; Carol Post, asst. secy., \$11,374 salary, \$216 expenses, no shares; D. W. Rausch, asst. treas., \$8,580 salary, \$1,066 expenses, 10 shares; E. W. Sexton, Jr., asst. treas., \$2,363 salary, \$6 expenses, no shares; E. B. Slocum, dir., no shares; L. W. Linville, dir., 550 shares; Preston Walker, dir., 50 shares.

LAKE CENTRAL AIRLINES, INC.

OFFICERS: Dr. R. B. Stewart, exec. comm., bd. of dir., \$2,900 fee, 1,500 shares; Joseph J. O'Connell, chm. of bd., \$2,400 salary, \$2,100 fee, \$459 expenses, 1,666 shares; Owin Hicks, dir. & pres., \$18,500 salary, \$11,425 expenses, 6,532 shares; L. W. Hartman, dir. & exec. v.p., \$18,500 salary, \$300 fee, 5,900 shares; William H. Krieg, dir. & sec., \$30 fee, 1,678 shares; R. W. Clifford, dir. & v.p., \$15,611 salary, \$1,111 expenses, 2,839 shares; J. Dwight Peterson, dir., \$1,200 fee, no shares; Cecil A. Berry, dir., \$350 fee, no shares; Harvey Goff, dir., \$14,051 salary, \$435 expenses, 1,500 shares; A. E. Sabe, dir., \$14,238 salary, \$195 expenses, no shares.



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meet tight schedules. And we have the production and engineering know-how that could only come from 13 years' experience with four-engine conversions. That's why we can offer fast, economical cargo conversion of your Constellations. May we discuss your requirements?



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penses, 4,230 shares; D. S. Getchell, v.p., \$12,750 salary, \$448 expenses, 1,333 shares; J. L. Carr, asst. treas., \$10,442 salary, \$416 expenses, 4,100 shares; A. F. Grisard, asst. sec., 4,181 shares; J. R. Carr, Jr., asst. sec., \$50 bonus, 509 shares; R. P. West, asst. sec., 1,233 shares; E. McC. Blair, dir., \$600 fee, 16,700 shares; Wilbert E. Chope, dir., \$100 fee, no shares; W. W. Brown, dir., \$100 fee, \$65 expenses, 2,000 shares.

MOHAWK AIRLINES

OFFICERS: R. E. Beach, dir. & pres., \$32,000 salary, \$19,100 expenses, 10,000 shares; J. R. Carver, dir. & v.p., \$24,500 salary, \$2,758 expenses, 4,018 shares; C. A. Bancroft, dir. & v.p., \$24,500 salary, \$2,679 expenses, 3,782 shares; T. J. Kirkup, v.p., \$13,000 salary, \$1,926 expenses, 1,600 shares; D. E. Postle, v.p., \$4,500 salary, \$284 expenses, no shares; E. V. Underwood, chm. of board, \$4,500 salary, \$561 expenses, 3,000 shares; F. R. Chabot, treas., \$15,500 salary, \$1,224 expenses, 100 shares; B. C. McLaren, sec., \$10,677 salary, \$1,903 expenses, no shares; R. J. Longwell, asst. treas., \$9,667 salary, \$1,448 expenses, 12 shares; L. P. Hornbrook, asst. secy., \$5,300 salary, \$499 expenses, 16 shares; R. V. Stephenson, v.p., \$11,500 salary, \$2,212 expenses, 150 shares; R. R. Taylor, asst. v.p., \$13,000 salary, \$1,076 expenses, 254 shares; H. R. Thomas, asst. secy., \$6,867 salary, \$1,233 expenses, 15 shares.

NORTH CENTRAL AIRLINES

OFFICERS: H. N. Carr, pres. & dir., \$40,000 salary, \$800 fee, \$4,425 expenses, 53,300 shares; F. N. Buttemer, v.p.-traffic and sales, \$15,600 salary, \$2,767 expenses, 5,250 shares; A. E. Schwandt, v.p.-indust. rel., \$12,240 salary, \$794 expenses, 3,675 shares; R. H. Bandio, Sr., v.p.-mainf. & eng., \$14,100 salary, \$726 expenses, 6,825 shares; A. D. Niemeyer, v.p.-oper., \$15,650 salary, \$630 expenses, no shares; B. Sweet, v.p.-secy., \$14,220 salary, \$755 expenses, 5,250 shares; J. P. Dow, asst. secy., \$6,840 salary, \$693 expenses, no shares; A. E. A. Mueller, chm. of board & dir., \$27,500 salary, \$800 fee, \$9,771 expenses, 550,972 shares; W. L. Christensen, accdg., consult. & dir., \$2,400 salary, \$600 fee, \$210 expenses, 5,462/2 shares; G. F. DeCousin, sales consult. & dir., \$2,400 salary, \$800 fee, \$95 expenses, 9,190/2 shares; K. B. Willlett, dir., \$700 fee, \$380 expenses, 9,074 shares; A. L. Wheeler, v.p. & counsel & dir., \$27,000 salary, \$600 fee, \$10,034 expenses, 1,050 shares; G. R. Hood, dir., \$700 fee, \$472 expenses, 1,155 shares.

OZARK AIR LINES

OFFICERS: F. W. Jones, ch. of board, \$7,783 salary, \$900 bonus, \$1,119 expenses, 459,867 shares; Laddie Hamilton, ch. of board, pres., \$19,346 salary, \$450 bonus, \$1,777 expenses, no shares; J. H. Fitzgerald, pres., \$13,542 salary, \$225 bonus, \$2,207 expenses, 1,000 shares; A. G. Hayne, secy., \$10,000 salary, \$13,800 bonus, \$208 expenses, 40,000 shares; E. H. Green, treas., \$2,083 salary, \$900 bonus, \$557 expenses, 45,933 shares; O. L. Parks, dir., \$675 fee, no shares; E. W. Weaver, dir., \$900 fee, \$1 expenses, no shares; G. O. Shaver, dir., \$15,461 salary, \$900 fee, \$759 expenses, 11,470 shares; G. A. Bachman, dir., \$900 fee, \$348 expenses, 14,950 shares; J. P. Bradshaw, dir., \$425 fee, \$137 expenses, 45,833 shares.

PACIFIC AIR LINES

OFFICERS: Leland Hayward, ch. of board, \$2,058 expenses, 143,988 shares; John H. Connally, pres. & dir., \$24,999 salary, \$3,536 expenses, 146,784/2 shares; Walter Roche, secy. & dir., 716 shares; Floyd L. Hendrickson, dir. & asst. secy., 4,890 shares; T. R. Mitchell, v.p. & dir., \$19,999 salary, \$6,502 expenses, 1,400 shares; R. E. Costello, v.p.-traffic, \$12,208 salary, \$3,711 expenses, 500 shares; N. A. King, v.p.-sales, \$11,600 salary, \$6,147 expenses, 20 shares; E. R. Dahl, treas., \$11,000 salary, \$821 expenses, 200 shares; C. A. Myhra, v.p.-finance, \$11,467 salary, \$527 expenses, no shares; Daniel T. O'Shea, dir., 1,162 shares; William B. Smullin, dir., 100 shares; Harry S. White, dir., \$57 expenses, 100 shares; William Goetz, dir., 7,288 shares.

PIEDMONT AVIATION, INC.

OFFICERS: T. H. Davis, pres. & treas., \$25,000 salary, \$4,829 expenses, 115,621 shares; C. G. Brown, Jr., v.p., \$13,512 salary, \$2,892 expenses, 4,200 shares; H. K. Saunders, v.p., \$16,000 salary, \$2,909 expenses, 4,225 shares; R. S. Northington, v.p., \$11,004 salary, \$2,724 expenses, 6,100 shares; M. F. Fare, sec. & asst. treas., \$10,800 salary, \$1,741 expenses, 6,151 shares; T. W. Morton, asst. conf., \$8,400 salary, \$394 expenses, 200 shares; R. N. Hansen, asst. sec., no shares; G. E. Anderson, dir., \$100 fee, 100 shares; E. L. Davis, Jr., dir., \$100 fee, 8,036 shares; E. L. Davis, Jr., dir., \$100 fee, 5,622 shares; Frank Dowd, dir., \$100 fee, 1,000 shares; R. W. Gardner, dir., 13,000 shares; Bowman Gray, dir., 10,000 shares; C. E. Norfleet, dir., \$100 fee, 2,679 shares.

SOUTHERN AIRWAYS

OFFICERS: Frank W. Hulse, pres. & dir., \$25,000 salary, \$5,809 expenses, 36,019 shares; Graydon Hall, *Continued on page 72*

THE AIRESEARCH GULFSTREAM COMPLETION PROGRAM

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JUNE

AIRLIFT

Load Factors Dip, But Jet Costs Near Stability

Influx of more aircraft is strongly felt as airlines enter jets' second year

Jet load factors during the first quarter of 1960 showed their first pronounced dip as the scale of operations increased over earlier periods. Between January and March both Eastern and National introduced DC-8 service and other airlines expanded their jet operations.

On Boeing 707s, load factors declined from the 90% plus of the first two quarters of 1959 to 69% in the first quarter of this year.

On the cost horizon, signs of stabilization are beginning to appear. 707 flight operating costs held at the previous level during the period, whereas

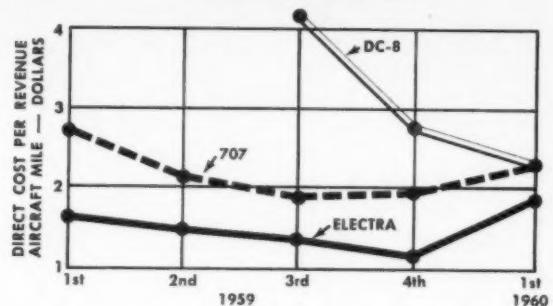
the DC-8 expenses dropped to 707 levels. It is interesting to note that the DC-8 cost pattern is closely following that paved by the 707 in its first two quarters of service.

Maintenance—Costs were up from 11.6¢ to 16.1¢ per mile for AA and from 9.5¢ for TWA. Indirect maintenance costs also rose. CAL jumped from 9.6¢ to 14.1¢ and AA from 25.1¢ to 36.8¢.

Load factors—Coach declined more rapidly than first class. At American, coach slid from 80% in the 4th quarter to 71.3%, while first class dipped from 70.7% to 65.8%.

Trip Distances—Length of jet hauls

TOTAL DIRECT OPERATING COSTS PER REVENUE AIRCRAFT MILE



continues to decline. The 707 dropped from 1,640 mile average for the last quarter of 1959 to 1,582 in the 1st quarter of '60.

Speeds—The DC-8 generally averaged a slower speed at the same length of haul varying anywhere from 0 to 26 mph. Braniff's 707-220, advertised as the "fastest" jet, realized as good a speed at shorter stages as the 707-120 at much longer hauls. Top speed for all the jets was TWA's 707-331 operating on exceptionally long average hauls at 507 mph—30 mph faster than reported by any other operator of 707s.

FIRST QUARTER, 1960, JET OPERATING COSTS AND STATISTICS

Costs in cents per revenue mile*

BOEING 707							DOUGLAS DC-8				
	AA	BNF	CAL	NAL	NEA 707-331	TWA 707-131	TWA 707-331	DAL	EAL	NAL	UAL
Crew Salaries and Expenses	25.7¢	20.2¢	20.1¢	21.9¢	16.7¢	27.3¢	22.0¢	22.2¢	15.1¢	22.1¢	24.3¢
Fuel, Oil, and Taxes	49.8	55.3	55.7	56.1	59.0	48.2	13.8	59.0	53.8	81.5	54.6
Insurance	10.8	23.3	15.2	15.9	37.0	18.7	18.3	22.2	42.2	36.1	11.6
Other .....	.....	.....	.....	.....	.....	.2	.3	....	....	2.2	.8
Total Flying Operations	86.3	98.8	91.0	93.9	53.7	94.4	54.4	103.4	111.1	141.9	91.3
Maintenance											
Labor	16.1	7.5	9.3	....	....	15.5	6.2	17.5	19.5	14.4	16.9
Materials & Outside Repairs	27.9	22.2	30.1	....	....	42.5	6.0	33.5	21.9	1.3	21.8
Reserves .....	....	30.8	8.8	....	....	3.2	38.3	....	(.9)	5.8	..
Total Direct Maintenance	44.0	60.5	48.2	....	....	61.2	50.5	51.0	40.5	21.5	38.7
Indirect Maintenance	36.8	28.8	14.1	....	....	31.7	12.5	29.9	18.8	21.0	38.4
Total Maintenance	80.8	89.3	62.3	....	....	92.9	63.0	80.9	59.3	42.5	77.1
Depreciation											
Aircraft	28.1	28.0	19.0	....	....	....	....	32.9	46.4	49.5	36.1
Engines	11.2	7.8	4.2	....	....	5.3	9.3	21.6	12.0	29.5	18.8
Parts and Other	4.1	6.3	3.5	....	....	4.6	....	3.6	11.3	5.9	4.7
Total Depreciation	43.4	42.1	26.7	....	....	9.9	9.3	58.1	69.7	84.9	59.4
Aircraft and Engine Rentals .....	....	....	.4	214.0	353.0	67.7	67.0	....	....	....	....
Total Aircraft Operating Expenses	210.5¢	230.2¢	180.4¢	307.9¢	406.7¢	264.9¢	193.7¢	242.4¢	240.1¢	269.3¢	228.0¢
Hours Flown											
Revenue	15,818	1,097	3,849	1,568	420	10,612	276	3,287	913	249	8,085
Training	506	358	133	....	....	241	31	95	518	206	1,037
Other	163	17	17	1	....	102	5	45	74	7	240
Total Hours Flown	16,487	1,472	3,999	1,569	420	10,955	311	3,427	1,505	482	9,362
Revenue Utilization	7:15	7:54	10:08	6:47	8:11	7:49	7:27	6:37	3:41	4:29	5:42
Average Fleet Size	24.0	1.5	4.1	2.5	6	14.9	4	6.0	2.7	7	15.6
Revenue Aircraft Miles	7,532,029	509,919	1,791,055	726,693	194,594	5,036,125	139,649	1,437,348	422,679	124,294	3,745,970
Passenger Load Factor—First Class	45.8%	49.5%	54.5%	77.0%	64.3%	64.8%	59.0%	82.8%	78.0%	42.8%	45.2%
Passenger Load Factor—Coach	71.3	54.4	53.7	88.2	87.3	71.4	64.8	71.5	87.7	77.8	77.0
Average Seats Per Mile	110.7	106.0	110.5	125.0	138.5	111.2	116.5	117.0	114.5	128.9	105.0
Average Passengers Per Mile	78.7	65.3	59.7	105.5	115.0	76.4	74.2	81.9	96.9	94.8	74.8
Cost Per Seat Mile	1.90¢	2.17¢	1.63¢	2.44¢	2.93¢	2.39¢	1.66¢	2.07¢	2.10¢	2.07¢	2.17¢
Cost Per Passenger Mile	2.67	3.52	3.03	2.75	3.53	3.47	2.61	2.76	2.43	2.84	3.28
Average Flight Length—Miles	1,813	898	1,158	1,091	1,091	1,744	2,328	987	1,071	1,044	1,369
Average Speed—Airborne—mph	477	464	465	463	463	475	507	438	463	462	458
Average Speed—Block-to-Block	443	417	438	420	403	442	467	390	417	404	417
Fuel—Gals. Per Hour	2,245	2,622	2,285	2,535	N.A.	2,200	2,435	2,375	2,430	2,528	2,350
Oil—Gals. Per Hour .....	.33	N.A.	N.A.	.12	N.A.	.46	.48	N.A.	.76	.57	.63

* Domestic operations only. Source: AIRLIFT research, from CAB records.

Turboprop Maintenance Costs, Salaries, Other Expenses Still Climb

The Lockheed Electra during the first quarter of 1960 produced stable flying operation costs although pilot salaries and expenses increased for all airlines except Northwest.

Maintenance costs were also on the climb over the previous quarter (*AIRLIFT*, May). Depreciation and utilization remained static with the biggest jump in

the latter category being Eastern's hike in utilization from 6:42 to 7:34 hrs. a day.

In Viscount operations, Capital's costs increased whereas CAL and NEA showed a decline. Capital's load factor was off 5.3 points for 1st class and 8.3 for coach.

The Convair 540 showed improved costs over its

4th quarter performance with total operating costs of \$1.21 per revenue mile.

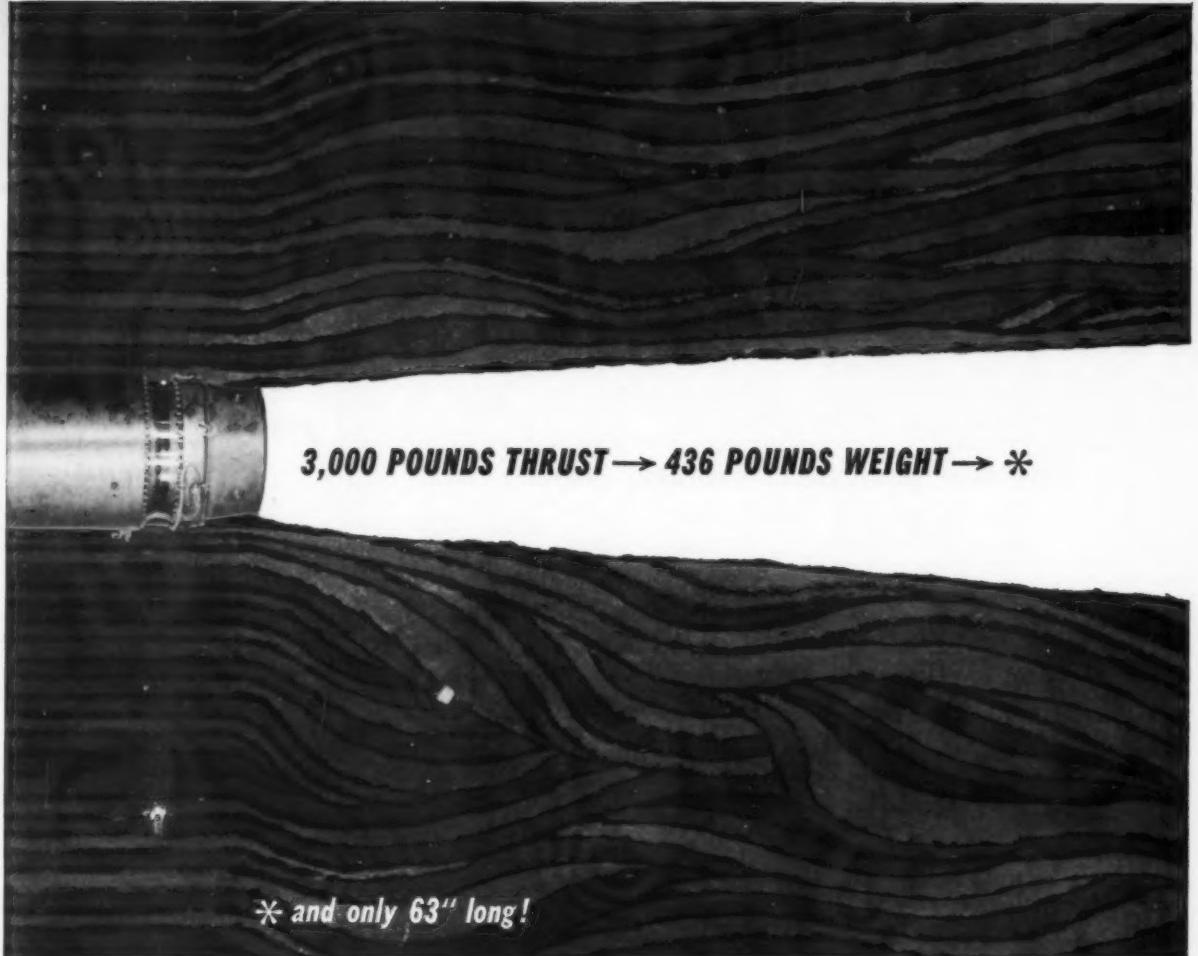
The Fairchild F-27, hampered by higher pilot levies, showed higher operating costs. F-27 utilization was paced by West Coast with 7:27, a good average even for a trunk airline. Most other locals averaged in the area of six hours a day.

FIRST QUARTER, 1960, TURBOPROP OPERATING COSTS AND STATISTICS

Costs in cents per revenue mile *

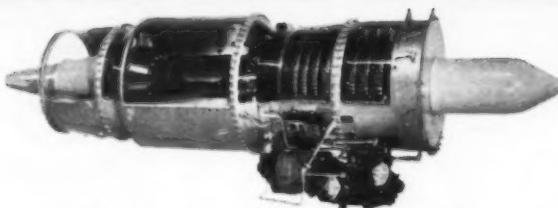
	LOCKHEED ELECTRA	MAUL	NWA	WAL	CAP V-745	VISCONT CAL V-812	CONVAIR 540 AAA V-745	BAL	OZA	PAC	PAC	FAIRCHILD F-27
Crew Salaries and Expenses	25.0¢	27.1¢	24.6¢	22.4¢	24.7¢	21.0¢	22.2¢	23.1¢	19.4¢	23.1¢	19.4¢	26.7¢
Rent, Oil and Taxes	23.3	24.5	25.4	23.6	22.1	21.5	16.3	17.6	15.4	17.6	15.4	21.5¢
Insurance	5.3	5.7	8.4	3.0	2.8	4.5	6.7	9.7	6.6	7.9	6.6	18.8
Other	3.4	5.3	5.7	3.0	3.0	4.5	6.7	9.7	6.6	7.9	6.6	5.9
Total Flying Operations	59.1	53.7	57.3	58.8	49.3	47.0	50.5	51.0	42.8	49.3	44.2	50.8
Maintenance Labor	7.3	10.5	10.8	5.8	7.0	11.4	8.0	5.9	15.4	7.5	10.1	46.2
Materials—Outside Repairs	40.7	5.9	21.4	32.2	15.5	14.4	15.7	18.0	15.4	43.7	18.7	10.6
Reserves	29.7	(6.4)	1.8	...	...	1.4	(2.1)	...	6.6	17.9	(8.5)	10.6
Total Direct Maintenance	46.1	21.9	25.8	39.8	22.5	25.8	28.6	36.9	29.0	37.3	42.7	39.4
Indirect Maintenance	16.8	68.0	36.2	48.6	32.7	39.5	37.3	44.8	45.9	39.2	45.9	36.5
Total Maintenance	64.8	84.9	60.1	67.7	52.1	63.3	62.7	70.5	66.9	72.6	81.6	9.0
Depreciation	28.9	18.9	20.1	26.7	16.9	3.0	4.5	5.2	...	2.9	3.3	8.5
Aircraft Engines	4.9	7.3	7.0	4.4	4.1	2.6	4.6	4.7	...	13.5	2.4	2.8
Parts and Other	3.8	4.3	9.9	4.7	4.1	4.7	4.7	4.7	...	5.0	5.0	2.9
Total Depreciation	32.7	27.2	37.3	38.4	25.4	18.9	21.8	30.4	33.0	22.4	16.1	21.9
Aircraft and Engine Rentals	12.1	148.9¢	130.7¢	145.8¢	107.4¢	...	...	23.5	...	...	...	14.2
Total Aircraft Operating Expenses	148.7¢	148.9¢	130.7¢	145.8¢	107.4¢	106.1¢	125.7¢	121.2¢	95.0¢	117.4¢	115.8¢	104.9¢
Hours Flown—Revenue	14,791	4,695	26,722	7,332	7,121	3,776	46,109	9,948	6,097	3,347	1,443	4,007
Hours Flown—Training	429	86	351	346	344	541	754	75	107	43	51	8
Hours Flown—Other	162	92	322	24	77	25	474	67	12	31	3	33
Total Hours Flown	15,582	4,873	27,405	7,442	7,592	4,342	46,837	9,092	6,216	3,421	1,497	4,166
Revenue Utilization	5.37	6.33	7.34	6.83	7.57	7.11	9.01	6.33	4.11	6.00	5.22	5.16
Av. Fleet Size	1,527	544	8,796	2,280	816	2,483	547	1,286	606	11,386	201	7,29
Revenue Aircraft Miles	4,979	850	54,27%	53,87%	50,07%	51,57%	54,27%	2,389	741	154,640	727,118	507,827
Revenue Aircraft Miles	4,979	850	54,27%	53,87%	50,07%	51,57%	54,27%	2,389	741	154,640	727,118	507,827
Pass. Load Factor—First Class	48.7	58.6	62.2	64.9	41.1	57.0	44.4	44.0	44.3%	42.1%	40.1	40.7%
Pass. Load Factor—Coach	68.2	75.0	69.0	77.0	46.7	73.1	24.6	26.3	38.0	36.0	35.6	37.9
Av. Seats Per Mile	43.5	39.4	38.0	41.6	49.2	23.1	20.3	17.4	16.9	17.1	14.6	17.8
Av. Passengers Per Mile	2,474	1,984	1,894	1,934	2,434	2,044	2,844	2,744	2,544	3,224	3,444	2,754
Cost Per Passenger Mile	3.88	3.78	3.51	3.51	3.51	3.18	4.67	4.32	5.97	5.39	6.57	5.88
Av. Flight Length—Miles	523	425	545	426	657	324	235	237	148	115	129	119
Av. Speed—Airborne—mph	330	325	329	311	345	326	247	227	217	193	201	192
Av. Block—Block Hours	292	291	274	313	308	219	238	215	194	158	176	168
Fuel—Gals. Per Hour	793	770	746	753	743	644	526	483	249	275	267	256
Oil—Gals. Per Hour	36	N.A.	.25	.36	1.08	N.A.	.10	N.A.	.27	.07	N.A.	.08

*Domestic operations only. Source: *AIRLIFT* research, from CAB records.



3,000 POUNDS THRUST → 436 POUNDS WEIGHT → *

** and only 63" long!*



New Pratt & Whitney Aircraft JT12 jet engine is built around proven design concepts for high thrust to weight ratio, ruggedness, reliability and low maintenance.

The JT12 delivers heavyweight thrust in comparison to the light weight of the engine itself. At maximum cruising speed the thrust specific fuel consumption is only .890. A new jet engine designed on a proven principle, the JT12 is an axial-flow, medium-pressure-ratio turbojet. Behind the JT12 stands all the research, manufacturing and testing facilities that produced the renowned Pratt & Whitney Aircraft J-57 and J-75 designs—the new standards of aircraft engine reliability in commercial jet transportation. Because of the sound basic design of the JT12 and its relatively simple construction, it's an outstandingly reliable and easily maintained engine. The JT12 now powers such aircraft as the Lockheed JetStar transport, the North American Sabreliner and the Canadair CL-41 military trainers, and two U. S. Army drones. Today, the JT12 is establishing new flight performance records of its own.



PRATT & WHITNEY AIRCRAFT

East Hartford, Connecticut
A DIVISION OF UNITED AIRCRAFT CORPORATION

American Takes On-Time Lead

American Airlines took over the No. 1 position among domestic U.S. trunk airlines in February with 73.9% of its flights on-time within 15 minutes. United ranked second at 73.3% and Continental third at 72.7% to round out the top three.

Average for all trunkline operations for the month was 69.4%, an increase of 3% over January.

In jet operations, TWA topped the 707 and DC-8 operations with 55.2%, CAL was second and Braniff third. American's 76.7% led all Electra operators with Eastern Air Lines ranking

second at 70.6% of flights on time.

As in past months, the Electra maintained a margin of about 20 percentage points over the jets in average on-time performance for all operations.

In local airline operations, West Coast Airlines hit a remarkable 97.6% on-time operation for the month, more than 10 percentage points higher than Central Airlines in second place.

Of all operations, only the jets fell below the 50% on-time mark on the basis of average for all carriers. It dropped to 46.9% from 48.6% in January.

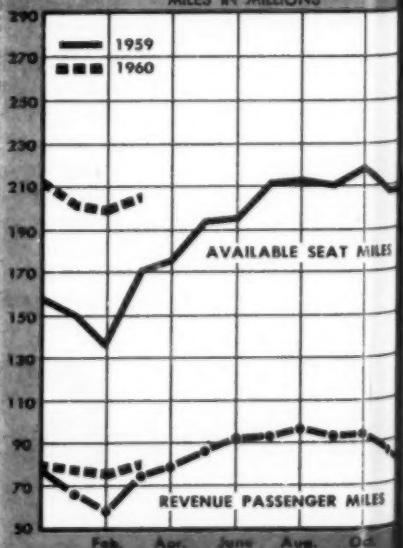
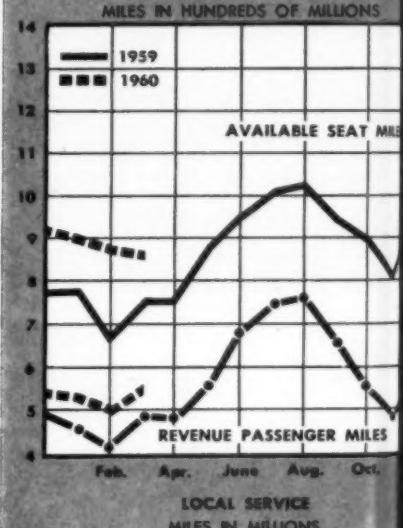
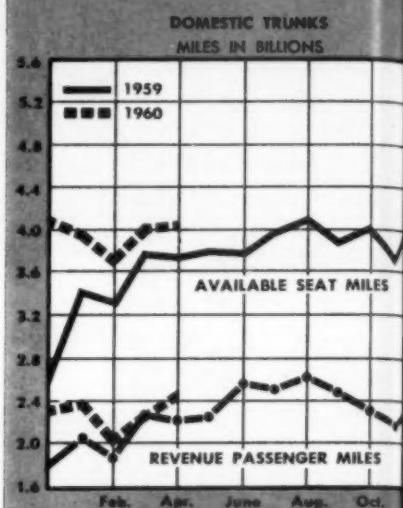
ON TIME BOXSCORE—FEBRUARY, 1960

TRUNKS	Rank	On Time to 15 min. late		On Time to 5 min. late	6-15 min. late	16-30 min. late	Over 30 min. late	Total flights reported
		January	February					
American	1	69.4%	73.9%	58.2%	15.7%	10.8%	15.3%	5751
Braniff	4	69.9	71.5	53.5	18.0	12.1	16.4	1280
Capital	8	65.2	68.5	46.5	22.0	15.1	16.4	3338
Continental	3	72.1	72.7	51.6	21.1	12.0	15.3	1203
Delta	11	62.7	62.8	37.8	25.0	16.7	20.5	1805
Eastern	7	67.3	68.8	50.1	18.7	13.0	18.2	4763
National	12	50.6	48.5	32.2	16.3	13.4	38.1	961
Northeast	9	62.5	67.1	49.3	17.8	11.7	21.2	2761
Northwest	6	62.3	70.0	52.3	17.7	12.3	17.7	1271
TWA	5	68.2	70.9	49.8	21.1	13.0	16.1	2736
United	2	69.6	73.3	53.5	19.8	12.1	14.6	3535
Western	10	59.2	64.4	38.5	25.9	18.9	16.7	1246
		66.4%	69.4%	50.1%	19.3%	13.0%	17.6%	30641
BOEING 707 and DC-8								
American	5	45.5%	47.9%	30.5%	17.4%	19.5%	32.6%	1077
Braniff	3	35.8	51.4	19.0	32.4	30.5	18.1	105
Continental	2	55.6	52.4	33.7	18.7	18.4	29.2	315
Delta	4	54.1	51.2	29.5	21.7	17.2	31.6	400
Eastern	9	No oper.	22.5	6.5	16.0	32.6	44.9	138
National	6	58.8	40.0	25.2	14.8	17.1	42.9	216
Northeast	8	48.1	25.9	5.2	20.7	8.6	65.5	58
TWA	1	56.1	55.2	37.7	17.5	19.4	25.4	657
United	7	30.5	32.1	15.1	17.0	23.0	44.9	430
		48.6%	46.9%	28.6%	18.3%	20.1%	33.0%	3396
LOCKHEED ELECTRA								
American	1	71.6%	76.7%	58.0%	18.7%	9.8%	13.5%	1619
Braniff	3	54.1	66.3	47.3	19.0	12.1	21.6	190
Eastern	2	68.4	70.6	55.9	14.7	9.8	19.6	1472
National	6	42.1	45.5	30.1	15.4	13.8	40.7	376
Northwest	4	44.7	52.0	32.4	19.6	15.8	32.2	311
Western	5	45.4	48.0	24.0	24.0	27.3	24.7	275
		64.1%	67.7%	50.3%	17.4%	11.8%	20.5%	4243
LOCAL SERVICE								
Allegheny	4	78.9%	80.7%	51.0%	29.7%	9.5%	9.8%	367
Bonanza	7	64.1	64.2	41.0	23.2	15.0	20.8	466
Central	3	95.3	86.8	70.1	16.7	7.0	4.2	72
Frontier	10	55.8	55.1	30.5	24.6	15.2	29.7	236
Lake Central	9	60.1	56.2	23.3	32.9	25.6	18.2	258
Mohawk	8	51.2	57.4	28.2	29.2	20.9	21.7	1117
North Central	5	66.3	73.6	54.1	19.5	13.4	13.0	1496
Ozark	11	52.5	52.7	27.8	24.9	19.8	27.5	647
Pacific	13	40.8	39.3	15.4	23.9	29.7	31.0	155
Piedmont	2	97.7	87.8	78.3	9.5	4.1	8.1	74
Southern	12	46.8	52.0	25.7	26.3	27.9	20.1	308
Trans Texas	6	69.6	73.1	46.1	27.0	17.4	9.5	126
West Coast	1	90.7	97.6	91.9	5.7	1.2	1.2	245
		60.9%	65.2%	41.4%	23.8%	16.8%	18.0%	5567
LATE REPORT—NORTHWEST AIRLINES, JANUARY, 1960								
Total System	10	62.1	70.0	45.3	17.0	14.3	23.1	1467
Electra	5	44.7	52.0	32.2	12.5	19.4	35.9	273

Statistics reflect nonstop and one-stop flights only. Data from airline reports to CAB.

HOW'S TRAFFIC

Among U.S. Airlines



U.S. Airline Revenues and Expenses

1st Quarter 1960 vs. 1959*

	Total Operating Revenues			Passenger Revenues			Total Operating Expenses			Net Operating Income		
	1960	1959	% Change	1960	1959	% Change	1960	1959	% Change	1960	1959	% Change
DOMESTIC												
American	\$ 94,270,996	\$ 67,638,643	39.4	\$ 84,015,049	\$ 59,889,643	40.3	\$ 95,449,436	\$ 71,451,163	33.9	\$ -1,378,638	\$ -3,812,520	...
Braniff	17,023,287	16,554,644	2.8	15,601,279	15,049,999	3.7	17,459,666	14,442,728	20.9	\$ -436,379	\$ 2,113,916	...
Capital	23,584,412	26,595,540	-11.3	21,901,993	25,188,215	-13.0	28,409,792	26,873,262	5.7	\$ -4,823,580	\$ -277,702	...
Continental	13,570,947	7,835,795	73.2	12,674,375	7,138,054	77.6	12,759,484	7,669,673	66.4	\$ 811,481	\$ 166,312	387.9
Delta	30,193,524	25,743,783	17.3	27,710,389	23,592,059	17.5	29,210,352	23,917,176	22.1	\$ 983,174	\$ 1,826,607	-46.2
Eastern	70,823,480	64,284,534	10.2	66,040,737	60,130,394	9.8	70,438,468	58,313,902	20.8	\$ 385,012	\$ 5,972,632	-93.6
National	19,241,347	21,828,652	-11.9	17,626,389	20,152,234	-12.5	19,909,638	18,503,396	7.5	\$ -668,291	\$ 3,325,254	...
Northeast	9,294,641	8,329,862	11.6	8,669,873	7,842,611	10.3	10,486,597	8,645,394	21.3	\$ -1,191,956	\$ -315,532	...
Northwest	21,430,036	19,111,349	13.2	19,018,581	17,063,264	11.5	21,936,672	19,957,744	9.9	\$ -305,836	\$ -840,375	...
Trans World	61,279,842	57,385,789	6.8	55,133,393	52,490,261	5.0	68,700,260	55,553,912	23.7	\$ -7,420,418	\$ 1,831,877	...
United	69,095,041	74,590,333	-7.4	59,925,090	64,702,959	-7.4	78,839,863	70,566,762	11.7	\$ -9,744,822	\$ 4,023,571	...
Western	16,211,954	12,546,394	29.2	15,163,476	11,649,945	30.2	14,105,080	10,289,469	37.1	\$ 2,106,874	\$ 2,256,925	-6.6
	\$446,222,331	\$402,449,548	10.9	\$403,480,525	\$364,899,652	10.6	\$447,905,710	\$386,186,583	21.2	\$ -21,683,379	\$ 16,262,965	...
INTERNATIONAL												
American	\$ 1,991,654	\$ 1,836,061	8.5	\$ 1,760,082	\$ 1,583,948	11.1	\$ 1,797,847	\$ 1,689,099	6.4	\$ 193,807	\$ 146,962	31.8
Braniff	2,058,187	1,848,072	11.4	1,747,545	1,569,187	11.4	2,536,958	1,879,436	35.0	\$ -470,771	\$ -31,364	...
Caribbean All.	939,818	800,091	17.5	867,447	733,467	18.3	787,119	552,402	42.4	\$ 152,699	\$ 247,489	-39.3
Delta	892,704	1,248,357	-28.4	806,238	1,144,218	-29.4	1,146,114	1,311,714	-12.6	\$ -252,410	\$ -43,357	...
Eastern Overseas	6,467,303	6,174,895	4.7	6,049,037	5,855,020	3.3	6,246,633	5,058,227	23.5	\$ 220,670	\$ 1,116,648	-80.2
San Juan	4,707,408	4,405,624	6.9	3,991,161	4,170,943	5.3	4,565,704	3,589,246	14.1	\$ 191,904	\$ 747,276	-81.0
Bermuda	317,043	314,722	0.7	293,749	284,075	3.4	355,208	304,880	15.7	\$ -38,165	\$ 7,642	...
Mexico	1,442,476	1,454,549	-0.8	1,344,127	1,599,942	-2.6	1,325,721	1,092,999	21.3	\$ 116,921	\$ 361,550	-57.6
National	434,918	1,055,453	-58.8	374,544	974,227	-61.4	552,232	1,057,225	-47.8	\$ -117,314	\$ -772	...
Northwest	8,093,079	8,191,590	-0.5	4,963,033	4,821,647	2.9	9,016,189	7,033,785	28.2	\$ -923,110	\$ 1,096,165	...
Panagra	4,771,778	4,524,112	5.5	3,625,504	3,500,397	3.6	4,926,624	4,626,157	6.5	\$ -154,646	\$ -102,045	...
Pan American System	85,457,812	71,758,202	...	67,147,111	53,122,829	...	88,347,115	76,826,782	...	\$ -2,689,303	\$ -5,048,580	...
Non-divisional	...	...	...	...	...	...	...	...	...	\$ 6,834	\$ 1,411	...
Latin American	26,455,476	23,756,036	...	20,484,467	18,598,907	...	28,346,160	24,503,939	...	\$ -2,200,584	\$ -747,903	...
Atlantic	33,807,466	28,039,657	...	26,185,019	21,330,029	...	34,355,444	31,146,872	...	\$ -547,958	\$ 3,104,215	...
Pacific	24,853,924	19,317,776	...	19,574,928	12,605,632	...	24,217,114	19,964,077	...	\$ 636,810	\$ 644,301	...
Alaska	850,952	644,733	...	700,697	488,261	...	1,435,233	1,211,483	...	\$ -584,307	\$ 564,750	...
Trans Caribbean	1,116,055	1,252,198	11.2	10,506,712	6,883,058	52.6	17,000,134	18,463,024	7.9	\$ -2,260,319	\$ 5,210,826	0.8
Trans World	14,739,815	13,252,198	11.2	2,815,422	2,972,257	-5.3	2,779,027	2,912,454	-4.6	\$ 318,109	\$ 315,400	...
United	3,097,136	2,238,054	-4.1	1,074,607	974,945	10.2	2,076,070	1,727,849	20.2	\$ -127,598	\$ 83,559	...
Western	1,317,011	1,108,735	10.8	1,264,744	1,043,621	18.9	1,104,960	1,029,732	7.3	\$ 212,051	\$ 79,003	148.4
Plus 1959 Caribbean	\$130,462,415	\$116,082,235	...	\$101,929,419	\$85,200,306	...	\$136,240,952	\$123,604,755	...	\$ 5,778,537	\$ -7,522,520	...
LOCAL SERVICE												
Allegheny	\$ 2,431,392	\$ 2,321,716	4.7	\$ 1,441,882	\$ 1,238,201	16.4	\$ 3,099,225	\$ 2,483,001	24.8	\$ -667,833	\$ -161,285	...
Bonanza	1,761,723	1,295,498	35.9	1,115,567	817,550	36.5	1,812,382	1,220,487	48.5	\$ -50,659	\$ 75,468	...
Central	1,257,919	1,245,106	-0.6	510,965	523,707	-2.4	1,432,596	1,300,358	10.2	\$ -174,677	\$ -35,252	...
Frontier	3,038,471	2,088,591	45.5	1,347,474	983,388	37.0	3,386,844	2,202,609	53.8	\$ -340,373	\$ -114,018	...
Lake Central	1,088,303	1,019,934	-0.4	599,201	540,526	10.9	1,179,907	1,014,809	16.3	\$ -91,604	\$ 5,125	...
Mohawk	2,203,963	2,370,726	-7.0	1,415,384	1,768,527	-8.7	2,771,943	2,428,383	14.1	\$ -567,980	\$ -57,457	...
North Central	4,349,624	3,619,024	20.2	2,680,129	2,054,288	30.5	5,064,497	3,641,927	38.4	\$ -716,873	\$ -42,903	...
Ozark	2,503,223	2,103,324	19.0	1,523,419	1,306,744	16.6	3,071,287	2,299,455	33.6	\$ -568,064	\$ 196,131	...
Pacific	2,198,825	1,763,875	24.6	1,398,229	1,131,133	23.6	2,899,554	1,920,130	51.0	\$ -700,729	\$ 156,255	...
Piedmont	2,464,529	2,354,548	4.7	1,346,846	1,577,904	-14.7	2,929,232	2,755,194	6.3	\$ -44,703	\$ -400,446	...
Southern	1,401,276	1,391,451	15.1	853,552	734,409	15.9	1,865,157	1,424,543	30.9	\$ -263,881	\$ -32,912	...
Trans-Texas	1,948,472	1,811,428	7.6	1,074,607	974,945	10.2	2,076,070	1,727,849	20.2	\$ -127,598	\$ 83,559	...
West Coast	2,383,197	1,329,835	79.2	1,374,676	845,642	58.8	2,827,493	1,918,700	47.4	\$ -444,296	\$ -588,845	...
	\$ 29,230,917	\$ 24,735,713	18.2	\$ 16,880,951	\$ 14,519,004	16.3	\$ 34,418,187	\$ 26,357,485	30.6	\$ 5,187,270	\$ -1,621,772	...
HELICOPTERS												
Chicago	\$ 716,392	\$ 602,344	18.9	\$ 379,392	\$ 160,591	136.2	\$ 748,541	\$ 537,974	39.1	\$ -32,149	\$ 44,370	...
Los Angeles	358,560	327,884	9.4	48,096	42,296	15.6	344,035	299,749	14.8	\$ 14,525	\$ 28,135	-8.4
New York	795,167	762,333	4.3	212,488	153,082	38.9	807,540	747,987	7.9	\$ -12,373	\$ 14,346	...
	\$ 1,870,119	\$ 1,692,561	10.5	\$ 640,978	\$ 355,971	80.1	\$ 1,900,116	\$ 1,585,710	19.8	\$ -29,997	\$ 106,851	...
INTRA HAWAII												
Aloha	\$ 1,056,820	\$ 539,550	95.9	\$ 944,281	\$ 508,662	88.6	\$ 1,100,128	\$ 625,556	75.9	\$ -43,308	\$ -86,006	...
Hawaiian	2,140,285	1,557,308	37.4	1,409,050	1,257,489	12.0	2,264,540	1,587,529	42.6	\$ -124,259	\$ -30,221	...
	\$ 3,197,105	\$ 2,096,858	52.5	\$ 2,373,331	\$ 1,766,351	34.4	\$ 3,364,668	\$ 2,213,085	52.0	\$ -167,563	\$ -116,227	...
ALASKA												
Alaska	\$ 1,923,407	\$ 1,524,042	26.2	\$ 470,972	\$ 510,047	-7.7	\$ 1,964,924	\$ 1,624,445	20.9	\$ -41,517	\$ -100,383	...
Alaska Coastal	438,278	365,442	19.6	171,002	128,738	32.8	510,892	410,943	24.3	\$ -72,614	\$ -44,491	...
Cordova	282,860	288,037	-18.0	27,804	24,059	15.6	306,871	256,754	19.5	\$ -24,011	\$ 31,283	...
Ellis	296,935	261,762	13.4	128,056	97,098	31.9	299,121	240,128	24.6	\$ -2,186	\$ 21,634	...
Nor. Consolidated	685,346	533,245	28.5	132,335	127,874	3.5	707,260	647,644	9.2	\$ -21,914	\$ -114,399	...
Pacific Northern	2,140,186	2,234,220	-3.8	1,053,321	1,160,592	-9.2	2,592,771	2,376,442	9.1	\$ -444,585	\$ -142,235	...
Reeve	598,496	467,212	28.1	306,372	209,043	46.6	541,494	489,815	10.5	\$ 57,002	\$ 22,603	...
Wien	1,176,306	1,091,430	7.8	145,019	130,727	10.9	1,054,364	1,148,040	-8.1	\$ 121,942	\$ -54,610	...
	\$ 7,549,814	\$ 6,764,407	11.6	\$ 2,434,881	\$ 2,388,178	1.9	\$ 7,977,697	\$ 7,194,211	10.9	\$ -427,883	\$ -427,804	...
ALL CARGO												
	1960	1959	Change	1960	1959	Change	1960	1959	Change	1960	1959	Change
Airaco	NA	\$ 1,505,208	---	NA	\$ 75,586	---	NA	\$ 1,753,900	---	NA	\$ 1,591,466	---
Flying Tiger	\$ 3,263,554	\$ 3,362,781	-3.0	\$ 2,440,428	\$ 3,388,076	-27.4	\$ 5,820,340	\$ 6,706,102	-13.2	\$ 6,835,835	\$ 6,519,631	4.8
Riddle	1,213,692	1,530,402	-20.7	87,291	\$ 93,558	-90.7	1,331,843	2,492,259	-46.6	1,671,492	3,022,186	-44.7
Aerovias	NA	307,864	---	NA	25,754	---	NA	340,681	---	NA	376,138	---
Sea & Western	NA	1,423,898	---</td									



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Caravelle Makes Big Hit at Varig

Twin-engined French aircraft proves a strong lure to South American passengers, while its impressive record scores even more solidly with top management

By ROBERT BURKHARDT

The first Caravelles were 16th Century sailing vessels. Small but highly profitable merchantmen, they brought fame and fortune to their owners.

The 20th Century Caravelles are true namesakes. These advanced-design twin-jet transports are a pleasure to ride and a profit to operate. In Europe seven carriers now have Caravelles in operation: Alitalia, Finnair, SAS, Swissair, Royal Air Maroc, Air France and Air Algerie. In the Western hemisphere, Varig is pioneering with its Caravelle operations between Brazil and the U.S. United Air Lines has ordered a fleet of 20. Several other U.S. trunklines are talking price and delivery terms with Sud Aviation, French builders of the Caravelle.

In 1958, Ruben M. Berta, Varig's dynamic president, contracted for two Caravelles to be delivered in late 1959. This early order caused more than one airline executive to shake his head. In the U.S., particularly, twin-engine transport aircraft were considered a relic of the past. And the idea of a medium range jet was in itself questionable; jets were for high altitude, long-range operations.

It was understandable when Air France and Air Algerie ordered Caravelles. The French Government naturally wanted its flag carriers to fly French-built equipment. Even the orders placed by such other European airlines as SAS and Finnair could have been explained by the currency situation—dollars were hard to come by.

Then Varig placed its order and manufacturers and airlines alike had to take the plane seriously. Berta has a world-wide reputation for imaginative planning and bold decisions. Varig is a profit-making airline and its credit rating is of the best. Why would Berta buy a relatively untried two-engine jet for medium range operations when



Sleek lines of Caravelle (shown above in Varig's markings) suggest a smoothness of ride borne out by author. Note aft-mounted engines and high elevator.

turboprops aplenty—including the popular Viscounts—were available for immediate delivery?

Did Berta buy the Caravelle in spite of, or because of, its two (two only) engines? Did he approve of the unorthodox (by U.S. standards) engine placement? Why did he specify drag chutes instead of thrust reversers? And, most important, could Varig make money with the Caravelle in the terrible cut-price South American market?

It was to find answers to these questions that I flew the Caravelle from New York to Porto Alegre and back. The Caravelle was not designed for a 9,000 mile route or for long overseas flights. Best stage length for the model III—operated by Varig—is about 1,300 nautical miles. Some hops south of New York are more than 1,500 miles.

There is no indication that the public seriously minds the fact that the Caravelle has only two engines, or gives more than a passing thought to the risk of long over-water flights. In fact, instead of hesitating, the traveling public has eagerly waited in line for Caravelle seats.

Caravelle designers and Berta are

convinced that the Caravelle is as safe as any transport in operation today. But arguments against two engines are very persuasive, at least in theory. If one engine goes out, the plane with only two engines loses half its power, whereas if one engine fails on a four engine plane the power loss is only 25%.

Engineers at Sud Aviation studied all this, and at one time gave serious thought to a three-jet Caravelle. As tentatively sketched, this plane was to be equipped with three French Atar engines. The third engine would have been mounted at the base of the tail fin. This would have made for better one-engine-out performance but the design was awkward. Nothing came of it, anyway, for about this time Rolls announced its 10,000 pound thrust Avon jet series. This meant adequate power would be available from two engines.

The twin engine decision was strengthened by a study of accidents caused by engine failure. Conclusion: engine quality, not quantity, was the key safety factor. Further, with one engine out a transport airplane will usually waste no time landing at the



From the rear, Caravelle looks like no other airplane flying today. Passengers enter via self-contained stairs beneath tail section.

first available airstrip.

So it can also be argued that four-engine planes are twice as likely to abort a scheduled flight as a twin-engine plane. The Caravelle has an added safety factor.

With its clean, high-lift wing, the Caravelle will glide easily and can be landed with both engines off. Sud has run several test flights of 150 miles and more with engines off. Varig ran a test of its own last October. Its first Caravelle was taken up to high cruise altitude, 39,000 feet. The power was cut. Forty minutes later the engines were re-started. Glide distance was 193 miles.

In typical Rolls-Royce fashion, the Avon engines deliver in excess of the 10,000 pound thrust specified, a further margin of safety.

In the prototype Caravelle, the Avon RA 26 engines delivered 10,000 pounds of thrust at a specific fuel consumption of .86 lb./hr./lb. thrust. In the production Caravelle, the model RA 29 has been increased to 10,500 pounds thrust while fuel consumption was cut to .775 lb./hr./lb. thrust.

To the Caravelle passenger no amount of technical information is as impressive as the experience of a take-off. With a full load the Caravelle makes a sharp climb out—required by airport noise rules and also for most efficient operations. The sensation is as impressive as it is unexpected.

Almost immediately after takeoff the landing gear comes up and the plane assumes a high nose-up attitude for the climb out. Net effect is one of more-than-ample power. The Caravelle is rated to take off, if necessary, under one engine, but no rating is as reassuring to the well-traveled passenger as that first take-out climb.

One thing that restricts the Caravelle, as it does all jets, is heat. At full load, just short of 100,000 pounds, the Caravelle needs a runway at least 6,500 feet long at sea level and 86°F.

For a jet, these are not demanding requirements; but airports at both São Paulo and at Belem are under the minimums.

Brasilia is satisfactory—a 7,800 foot runway with moderate year-round temperatures. The airport at Rio is being lengthened to 10,725 feet. But Belem, just south of the equator at the mouth of the Amazon, is a problem. Temperatures average in the 90's; this, and the short runway, poses a real limitation.

On top of this is the need to carry adequate reserve fuel for the alternates—in the case of Belem this is São Luiz, 200 miles away. As a result, the 80-seat Caravelle is operated out of New York with 40 first class seats.

Drag chute for emergencies

There is a good deal of confusion about the drag chute used with the Caravelle. Some think it is used on all landings. When rumors were circulated that the Caravelle was having landing gear troubles (more on this later), the drag chute was said to be a necessary improvisation.

In point of fact, the drag chute is an emergency brake. Varig has only had to use it on one or two occasions when the runway was excessively slippery from a tropical rainstorm. With the drag chute, the Caravelle can be stopped in about 1,500 feet; the quick stop is not too comfortable but it is less abrupt than sudden braking in an auto.

The drag chute can be operated on engine-out landings and in this respect it is superior to thrust reversers. Drag chutes have other advantages: lower cost, \$16,000 for the chute vs. \$60,000 for the reversers; and lower weight, 130 pounds for the chute, 800 pounds for the reversers. In an aircraft that sells for \$2.6 million, the cost saving is not significant but the savings in weight is important, as is the better

efficiency possible from unencumbered engines.

In addition to the Parisian attractiveness of the plane—gold fabric, green leather trim, soft beige rugs and more leg room than the tallest Texan could use—there is Varig's luxury service to attract the passengers.

When Varig advertises as the "luxury airline," some prospective passengers are in danger of assuming that the luxury standard is something less than that of the U.S. or Europe. Not so. Having experienced the finest cabin service by one of the best of the European carriers, I can say that Varig has some ideas which the transatlantic carriers would be well advised to copy. Most of the food is served from mobile carts, so the passenger can suit his meal to his appetite. If he likes steaks, there are hot filet mignons; or a fish course. If he wants to eat lightly, there is smoked salmon, or just cheese and fruit.

The interior appointments of the Caravelle have the look of luxury, and the leather trim and soft fabrics have the feel of luxury. This, and the fine food, soft lights and music—the plane is quiet enough in cruise speed so the music is clear and conversation is in a normal voice—adds up to a most pleasant impression.

After flying some 10,000 miles on the Caravelle I have only one or two minor complaints, and it hardly seems proper to mention these in connection with such a superb ship. First has to do with air conditioning: it was often too cold in the cabin, and the air ducts create a definite draft. Even in the tropics, and in South America in late summer, I kept a sweater in the cabin with me and usually had to put it on shortly after take off.

From a mechanical standpoint, the Caravelle has been a completely reliable aircraft. Both manufacturers and operators are understandably mum about malfunctioning or failure, but it is known that there was some landing gear trouble with the early models. This now has been corrected; it was corrected before Varig's first Caravelle was delivered.

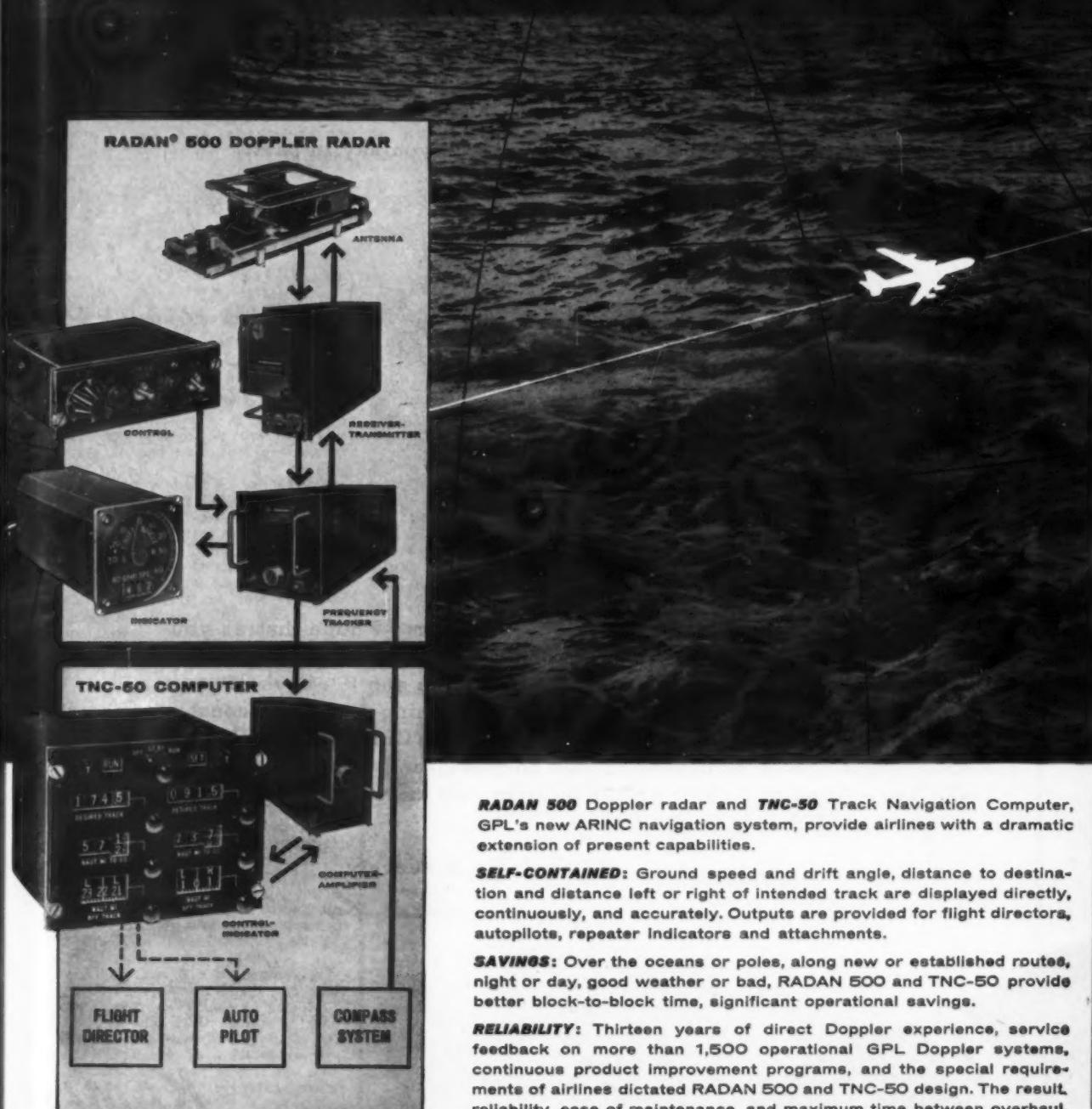
The problem was located in the hydraulic tubing and the fix was expensive; all tubing was replaced with stainless steel. There have been no problems with the Avon engines. Rolls maintains an overhaul base for its engines in Brazil, so expert attention is close at hand.

Even so, Berta has ordered an easy start for the Caravelle. "A pure jet is new to every department and we must all learn to work with this new tool," he told Varig employees. After full scale crew familiarization, first Caravelle

(Continued on Page 63)

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MEMO TO ROBERT:

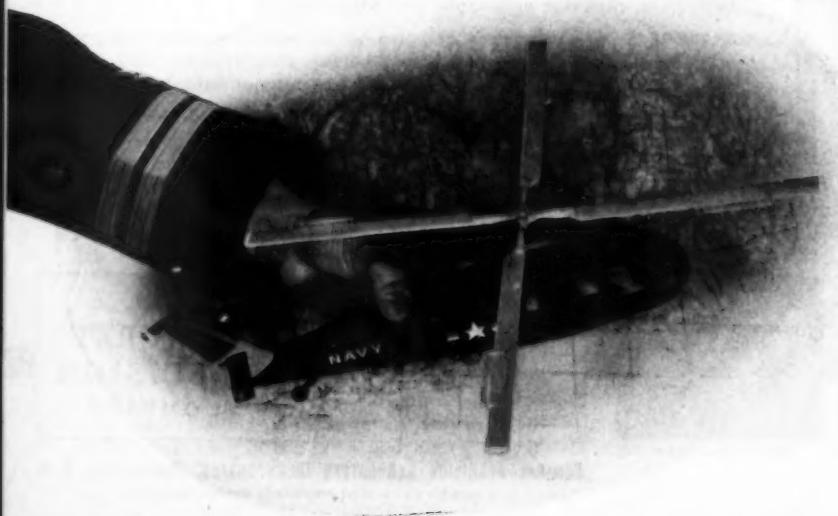
I am in receipt of your recent letter in which you say in part:

When I got the pictures that you sent me I was very happy and brought them to school with me and on my way home I had a fight with another kid I put books and the pictures on the ground and while I was fighting somebody took the pictures. I swear on the Bible that is the truth so could you please send me some more pictures of Kaman Helicopters.

Your new set of pictures is on the way. Robert, I hope that as you grow older and become a young man you will keep your interest in helicopters and aviation in general. When you and the boys of your generation take over the responsibility of running our great country, I hope you will find it strong and prosperous. Our National Defense effort right now is dedicated to that purpose, and with boys like you who are willing to fight for what is right, we know that our country will be in safe hands in the future.

Sincerely,

Charles W. Kaman



... IN
NATIONAL
DEFENSE

KAMAN
IS
PART
OF
THE
PLAN

(Continued From Page 60)

flights to New York were scheduled at average utilization of five hours per day. This was deliberately low so that no one would be hard pushed until the aircraft was familiar. Early this year one round trip per week was added and this boosted utilization to about seven hours per day.

When Varig's 707s take over from the Caravelles on the 14th of this

month they will fly a non-stop 9½-hour turnaround service between New York and Brasilia. Flights to Rio must await completion of the extension to the runway at Galeao airport; during construction only 5,200 feet of runway is available for use.

During this interim period the 707 flights will be met by both Caravelles at Brasilia. One will ferry passengers to Rio in a 1-hour, 35-minute flight.

The other will go to Sao Paulo, Porto Alegre and on to Buenos Aires.

Only when the Boeings can make their direct Rio-New York flights will the Caravelle finally be used for the purpose for which it was bought: luxurious, pure jet, short haul service on Varig's internal routes. Meantime, like the caravelles of old, these two jet-powered merchantmen are earning a tidy profit for their owners.

PAA Testing Out New Fire Detectors

Pan American World Airways has commenced an evaluation of a new aircraft fire detection system its inventor says will bring an end to false fire warnings once and for all.

The inventor is John E. Lindberg, ex-airline engineer turned designer, who some 10 years ago played an important role in the early development of piston engine ignition analyzers. Lindberg has been working for 12 years on the recently perfected fire detection system.

The Pan American test, involving one DC-7 and one Boeing 707, will be the first operational shakedown for the system. Engineers of other airlines, although openly complimentary as to its potential, no doubt will be watching PAA's results closely.

According to Lindberg, the Model 801 detector is the answer to false warnings that have plagued airline operations for years. It is virtually impossible for the system to give a false warning.

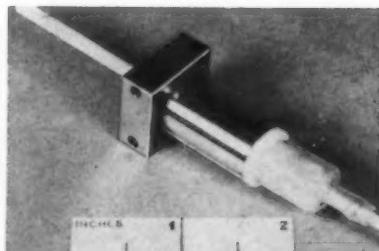
The basic system consists of a flexible, .040" diameter wire called a sensor, a second unit called a responder and finally a tail-wire junction. There are no black boxes, amplifiers, relays or other devices.

The system can be arranged to handle a variety of temperature sensing conditions. Normally it would be set to indicate a fire if the overall average temperature reaches 800°F, or if peak temperatures at any part of the sensor hit 1,000°.

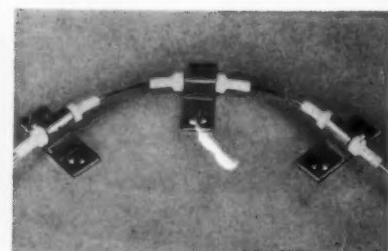
Operation of the detector is from 115-volt, 400 cycle a-c but it can be supplied to operate on other voltages. Weight of the responder and 30-ft. sensor is 0.20 lbs., the tail-wire junction is 0.07 lbs. Complete installation in a DC-8, involving three fire zones per engine on four engines, would be only 19 lbs. complete, Lindberg estimates.

Electrical operation of the system (see diagram) is as follows: Below the triggering temperature, resistance between Points A and B through the sensor and responder is about 10 ohms. With this much resistance in series, the supply voltage is not enough to light the signal lamp.

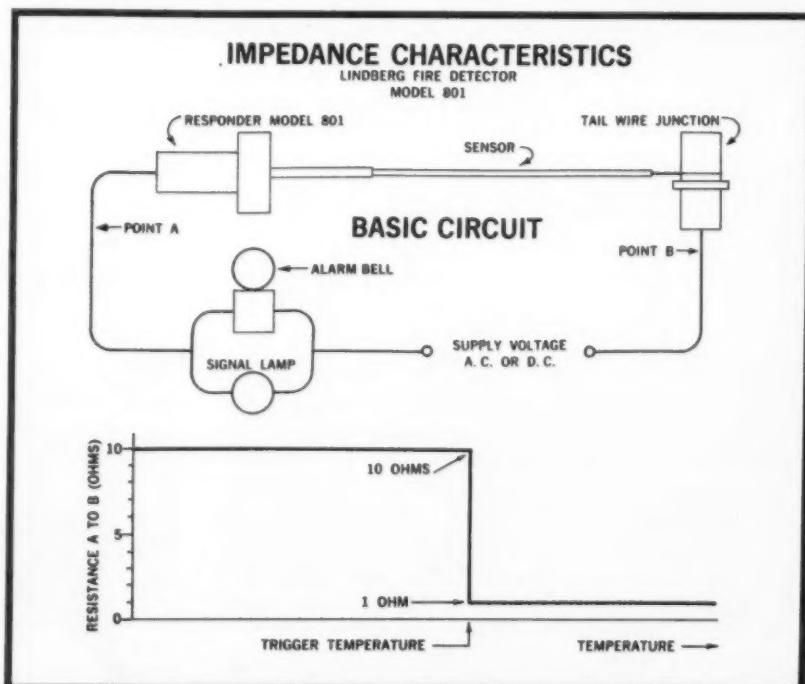
At the triggering temperature (a fire), the responder resistance drops to zero leaving only the sensor resistance of about one ohm. The current in the circuit therefore increases and signals the flight crew by lighting the signal lamp.



Responder is 1.750-in long, weighs 0.20 lbs. including 30-ft. length of sensor.



Sensor is 0.040-in. diameter, is supplied at any desired length up to 35 feet.



Wiring sketch of Lindberg fire detector system shows sharp drop in resistance that takes place at triggering temperature. System boasts no black boxes.

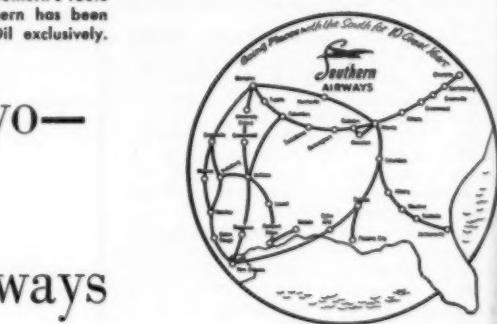


13,000 miles a day are flown by Southern Airways' fleet of 26-passenger DC-3's. Southern's route connects 47 cities in five states with major domestic and international airlines. Southern has been "Going places with the South for 10 great years"—using Texaco Aircraft Engine Oil exclusively.

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Tokyo, Tel-Aviv, Teheran—they're all within 55 hours' flying time from Tuscaloosa—or any of the 47 cities served by Southern Airways. Southern's system connects you with six major national and international airlines—provides you with the first step in air travel to almost any city on earth.

Now celebrating its 10th anniversary, Southern Airways has flown over 230-million passenger miles with a perfect safety record. And as they have done since their first flight, Southern uses Texaco Aircraft Engine Oil exclusively. In fact, more than 50% of total revenue plane miles flown in the last 24 years by scheduled domestic airlines have been flown with planes lubricated exclusively with Texaco Aircraft Engine Oil.



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AIRLIFT

AA Dials Announcements By Telephone at Idlewild

An innovation in airline passenger announcement systems—effectively utilizing tape instead of live announcers—has been installed in American Airlines' new passenger terminal at Idlewild. It was designed by Executone, Inc., 417 Lexington Ave., N.Y. and MacKenzie Electronics, Inc., Englewood, Calif.

It is an automatic, selective system which stores recorded flight and passenger announcements in memory racks, then fits them into proper sequence on command from a central computer. The sequence code is established by dialing, like a telephone, at any of American's eight departure lounges. Four additional stations are soon to be added.

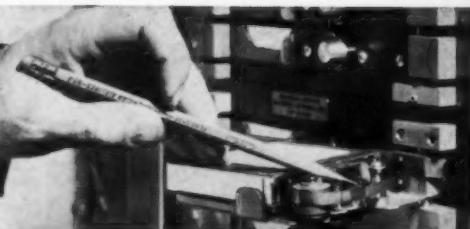
To announce an arrival, an operator picks up his telephone handset, pushes a button marked "automatic" to connect the dialing mechanism with the computer, dials a letter to establish the type of announcement, and dials the three digits of the flight number. Then

he hangs up. The correct announcement proceeds automatically.

Additional versatility is realized by provision for directing announcements to areas where passengers most concerned will hear them, and isolating them from the rest of the terminal system. If an announcement does not concern passengers in the lounge, for example, they continue to hear background music, while interested passengers (say, at the loading gate) will hear the announcement in the articulate voice of a well-trained announcer.

Should a situation call for a special announcement not previously programmed, or paging of a passenger, the system can be switched instantly to manual operation and used as any other public address system. It can also be tuned to VHF broadcasts, so passengers waiting in the gate areas can listen to conversations between crews of arriving aircraft and the tower.

All repetitive announcements can be programmed. A virtually unlimited



Closeup of the tape cartridge. Endless loop with message is indicated by pencil.

number of different message combinations is possible. American's daily schedule at Idlewild calls for announcement of 70 flights a day. But this is only about half the system's potential, and if utilization should exceed present capacity, more tape units can be added.

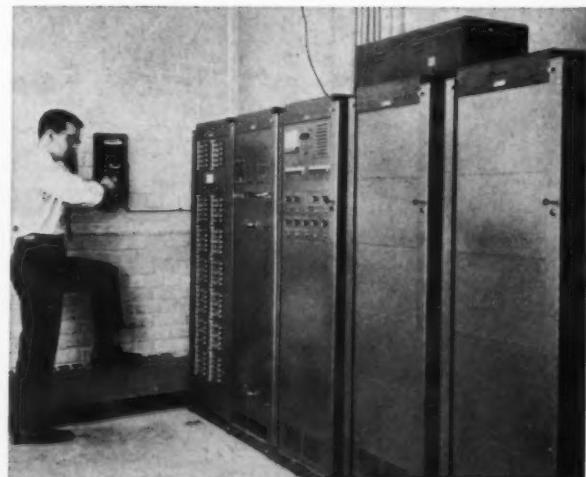
The system was installed in February, 1960, and went into operation in March. Cost to American was approximately \$80,000.

Problems of poor acoustics are solved by using a larger number of loudspeakers—407 in the AA installation—strategically placed around the terminal. The recording of announcements in acoustically-perfect studios by trained announcers helps avoid many pitfalls of intelligibility common to noisy transportation terminals.

Announcements in foreign languages can be programmed as easily as messages in English, thereby providing a solution to one of the airline's chief passenger-relations problems.



Gate position showing operator dialing code which triggers correct flight announcement. Switches at right select terminal areas in which announcements are to be heard. Operator dials only four figures to set up proper announcement from virtually unlimited number possible.



Five cabinets contain (left to right): tape selector with cartridges (1); programming unit (2); control panel for all stations (3); separate amplifiers for each gate position (4 and 5). Box on top is tape unit supplying recorded background music for entire terminal.

Tests Proceed on Doppler Navaid



Shown at left is airborne navigation system controller unit (CMA-601). At right is groundspeed and drift indicator, CMA-623.



By PHIL GERACI

Canadian Marconi's CMA-620 doppler radar—first of a new breed of self-contained navaids to enter airline service—has amassed more than 17,000 hours, 6,000 of them in jets, in routine operation. Four carriers are now evaluating the unit for possible full fleet implementation.

Pan American has several units, installed in DC-7s and 707s; four recently were delivered to KLM for installation in DC-8s; and others are being readied for delivery to Irish International and Varig. In addition, KLM has placed an order for four more sensors plus eight computers, all destined for DC-8 installation, while deliveries of sensor and computer units to Canadian Pacific Air Lines will start in August.

The Marconi system closely follows fundamentals laid down by ARINC Characteristic 540. Though the char-

acteristic detailed requirements in specific essentials, it left a fairly wide margin for technical ingenuity on the part of manufacturers.

Canadian Marconi attacked the design problem from the following quarters:

- Type of transmission: The CMA-620 is a high frequency FM/CW system. The unit is shielded against internal interference and is highly efficient. Its transmitter is rated at one-half watt.
- Number of beams: Four.
- Duplexing: None. The CMA-620 has separate transmit and receive antennas.
- Movable or passive antennas: Movable, with single transmitting array. Receiving antenna is comprised of a pair of back-to-back rotating linear arrays, one forward firing and one backward firing, feeding a pair of parabolic cylinders.

The question of moving versus stationary antennas is a moot facet of

doppler radar design. CMC technicians feel the advantages of a moving unit—simplicity of circuits, essentially—outweigh the threat of mechanical malfunction. They point proudly to the record thus far achieved by the CMA-620 in operation with established airlines.

In choosing the rotating antenna concept, Marconi designers feel they have surmounted one of doppler radar's knottiest obstacles. It is their firm opinion, for example, that:

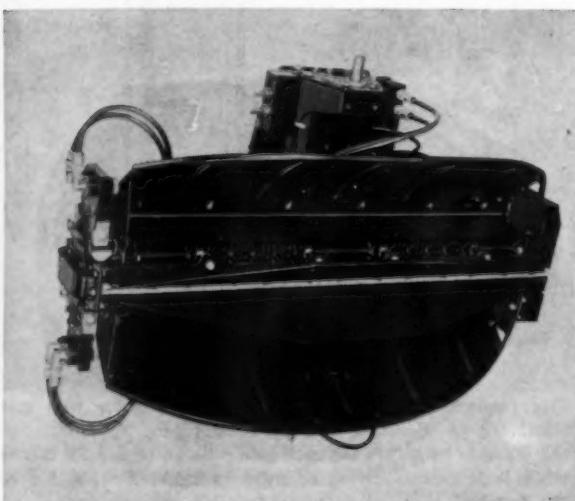
- The rotating antenna is superior in low altitude proficiency. It will perform accurately from 40 to 42,000 ft., whereas stationary antenna systems encounter difficulties below 3,000 ft. because of "altitude holes" inherent in any FM/CW system.

• These signal dropouts are due to reduction of antenna beamwidth, a problem avoided in the CMA-620 by its moving antenna and the difference in time of the radar paths to the ground from inner to outer edge of the antenna beams.

CMC officials also feel that an outstanding virtue of their system is the method used to confirm operating accuracy. "Lock Checking" is their term for a continuous, automatic check on the accuracy of the tracker oscillator frequency which gives warning of system malfunction within 20 seconds.

Whereas some doppler systems provide an indication of signal-to-noise ratio, the CMA-620 checks itself by deliberately upsetting the tracker oscillator and then watching to see if it regains stability. The disturbance is slight, and is not apparent on the indicator.

The Marconi doppler system has a single, audio frequency tracker which delivers groundspeed in a variety of forms (synchro, potentiometer, cycles)



Rotating antenna unit for Marconi doppler sensor CMA-623.

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and also provides a control signal for aligning the antenna with the track. Drift angle is obtained directly from the antenna as a synchro signal.

One of the biggest problems common to all doppler radar systems is satisfactory operation over smooth terrain

—water, ice or sand. The CMA 620 meets this challenge by automatically shifting from a four-beam to a two-beam mode whenever the signal drops below a specified level. At the same time, the antenna pitch is changed to point the beams downward more

steeply. The result is a 15 db boost in effective signal. Once every minute the system reverts to four-beam operation, and stays if signal is stronger.

The only penalty in two-beam operation is a reduction in ground speed accuracy by three to five percent.

Automatic ATC Moves Ahead

Work continues on digital system at FAA's Atlantic City facility

A solid-state digital computer designed to streamline nationwide air traffic control is being readied for testing at FAA's Atlantic City experiment center by Librascope division of General Precision, Inc., Glendale, Calif.

The computer is the first designed specifically for air traffic control. It is the key element of a data processing system which will ease the chores of 13,000 traffic controllers who presently handle clearance and control for civil and military air traffic manually.

Prime contractor for the data processing and display portion of the FAA system (known as Data Processing Central) is GPL Division of General Precision, Inc., Pleasantville, N.Y.

The data processor is made up of four units: digital computer, file drum, buffer and programmer's console. Each unit is six ft. high, three ft. deep. More can be added, unit by unit, as traffic mounts.

The data computer is expected to replace smaller computers now performing specialized functions at several control centers.

Speed and operating capability of the automatic system will outpace anything hitherto employed for traffic control.

In the New York area, for example, the computer will be able to process and print up to 1,600 flight progress strips per hour, process 440 flight plans per hour, and store a total of 1,000 flight plans. It will be able to sequence the arrival or monitor the departure of 90 aircraft per hour.

The computer can search up to 8,000 words of pertinent, stored information in 1/30 second. It can detect its own errors, and has duplicate file storage as well as parity and dual adder circuits for double checking its own figures.

It will process flight plans automatically and provide navigation check points. It will alert traffic controllers as much as 30 minutes in advance whenever two aircraft are on collision or too-close-for-comfort courses.

It is expected that the automatic ATC system will substantially speed up traffic control at the nation's 33 control centers and eliminate one big cause of delay as air traffic increases.

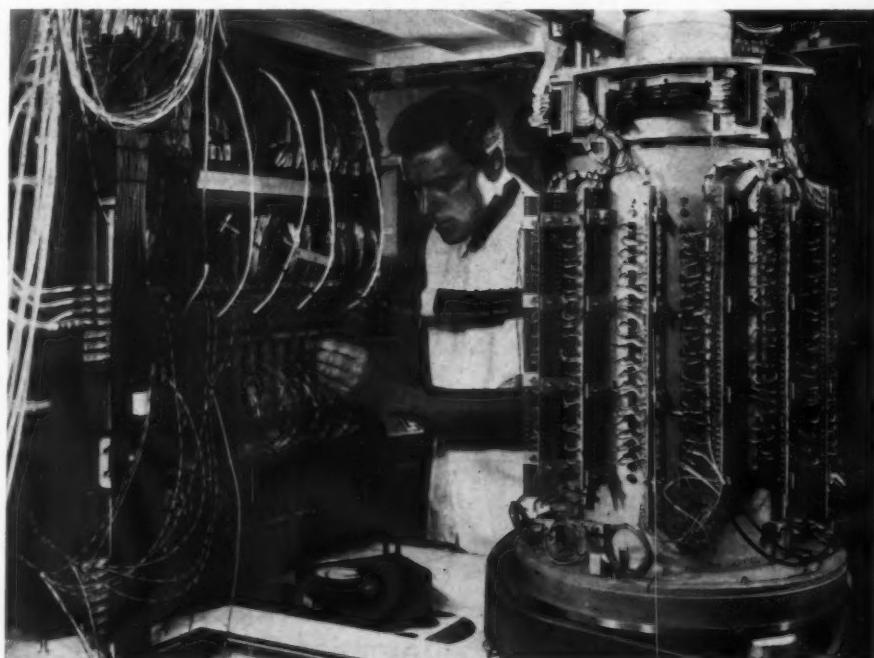
Should the equipment fail—due to a power loss, for example—the system will simply revert to manual operation until a fix is made.

Initial elements of the automatic system will be operated this year at



Operator, seated at programmer's console, checks control data on punched-paper tape.

Atlantic City. Similar equipment is being readied for later installation at New York. Eventually the system will be nationwide.



Technician performs checkout on file drum unit. Each drum stores 16,000 words representing aircraft identification, speed, altitude, winds, and ETA over check points.

By MICHAEL DONNE

Don't Underestimate Those British Pacts

One of the most significant features of the British civil aviation scene in recent weeks has been the emergence of a number of new agreements between U.K. and Commonwealth airlines, aimed at pooling traffic and revenues and sharing profits. Both British State-owned airlines are involved. British Overseas Airways Corporation has an agreement with Air India International and Qantas Empire Airways of Australia, which became effective April 1. The three carriers are pooling their services over many global routes. The combined fleet of the three carriers will eventually include 50 jet airliners, enabling the consortium to offer unrivaled services between Britain and India and the Far East, and Australasia.

Another significant agreement which came into force on April 1 is that between British European Airways and Mr. Aristotle Onassis's Olympic Airways of Greece. With B.E.A.'s seven Comet 4Bs and Olympic's four 4Bs, this consortium—which also pools

revenues and services—has a jet fleet of 11 aircraft to begin with, but this will expand further when B.E.A.'s 24 DH-121 jets come in around 1963 or 1964. The B.E.A.-Olympic network already blankets Europe with jet services, and both airlines are hoping for big things from their co-operation. B.E.A. alone hopes to have carried 500,000 passengers in its Comets by next October.

To follow up these "international pools" (which incidentally, go much further in their concept than the customary "single route" pooling agreements which B.E.A. already has with many other carriers in Europe) both the British state-owned airlines have recently reached new partnership agreements with some of the biggest British independent carriers, covering a wide range of British Colonial air services. B.O.A.C., for example, is to co-operate in the future with Eagle Airways (now controlled by the Cunard Steam-Ship Company) on routes from the U.K. to Bermuda and Nassau.

B.O.A.C. is also to co-operate with British United Airways (the new airline formed by the merger of Hunting-Clan Air Transport and Airwork) on runs from the U.K. to East and Central Africa, with both East African Airways and Central African Airways also involved.

British European Airways is also involved in new agreements—with Skysways on the route down to Tunis and Malta, and with British United Airways on the run to Gibraltar.

British Overseas Airways Corporation also recently inaugurated a new pooling agreement with TCA.

The aims of all these new links are three-fold. First, they are intended to create new bonds between Britain and the Colonial territories through the provision of cheap air services (cuts in fares of up to 25 percent on British Colonial routes from October 1 have been authorized by Aviation Minister Sandys), and they are also intended to improve air transport facilities between the larger member countries of the Commonwealth—such as Australia, India and Canada.

Secondly, they are intended to remove many of the difficulties inherent in having two separate broad sectors of air transport in Britain—one state-owned and the other privately-owned—by bringing them into partnership on Colonial routes, while leaving them free to compete elsewhere.

Thirdly, and particularly in the case of the pact between B.O.A.C., Qantas and Air India, and that between B.E.A. and Olympic, they are intended to form a solid front against foreign competition, especially competition from the Air Union consortium of Air France, Sabena, Lufthansa and Alitalia.

The effect of the agreements is undoubtedly going to be a struggle for traffic between the British and British Commonwealth carriers on the one side, and other foreign airlines on the other. In the face of the threat from Air Union, the Commonwealth has come closer together in air transport. Thus, the way is being cleared steadily for the eventual emergence of what may be called a "British Commonwealth Air Union."

This could be the biggest single air transport unit in the world, covering the whole globe, speaking with one voice in the councils of the I.A.T.A. and the I.C.A.O., and possibly even having a common equipment procurement policy. Its power would be immense. It may take a long time to emerge: snags may arise to bar its development. But even if that happens, the airlines of the U.K. and the Commonwealth are already banded together in smaller pacts and consortium arrangements which are at once a shield and a weapon in the fight for a bigger share of world air traffic.

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The Basic Airlift market encompasses:

- Air Carriers (scheduled airlines, supplemental and all-cargo carriers)—includes every scheduled air carrier in the free world
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- Overhaul, maintenance and modification operators, as well as parts and accessories distributors and service centers—includes all fixed base operators with engine and aircraft overhaul and maintenance facilities
- Civil governmental agencies responsible for air traffic control and navigation aids; governmental agencies responsible for licensing and regulating civil aviation activities; agencies responsible for provision and maintenance of public airport facilities

The Airlift market and dollar potential:

ORIGINAL REPLACEMENT (\$4 billion)

A good percentage will be spent for components and equipment specified by the carriers. This carrier selection includes engines, navigation and communication equipment, seats, galley and oxygen equipment plus hundreds of other items.

OVERHAUL REPLACEMENT (\$4 million)

Primarily for spare parts, such as oil filters, stop nuts, engine rings, spark plugs, etc. Airlines often switch from original equipment to a superior replacement item—or for standardization purposes.

GROUND SUPPORT AND MAINTENANCE EQUIPMENT (\$750 million)

This encompasses tractors, fueling devices, passenger loading equipment, baggage handling equipment, oil servicing units, engine test equipment, starting units, replating equipment, and machine tools. Cleaning compounds alone exceed \$4 million annually.

FUEL AND OIL (\$600 million)

This amount is expected to climb sharply as more jets (which burn four times as much fuel as piston aircraft) are put into service.

AIRPORT AND AIRPORT FACILITIES (\$1 billion)

This amount is estimated for the construction and improvement of airports for the next four years.

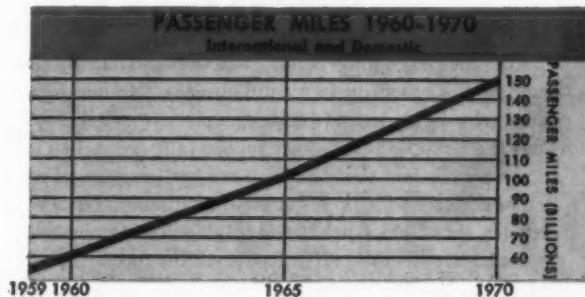
AIR NAVIGATION AND COMMUNICATION AIDS (\$130 million)

Includes VORTAC approach lighting, intermediate fields and beacons, long range radar, control centers and communication stations, traffic control towers and terminal area radar plus scores of other allied items. If you do not have **AIRLIFT**'s latest marketing reports, write for "Air Transportation—A Growth Market" and "The Shift in Buying Emphasis."

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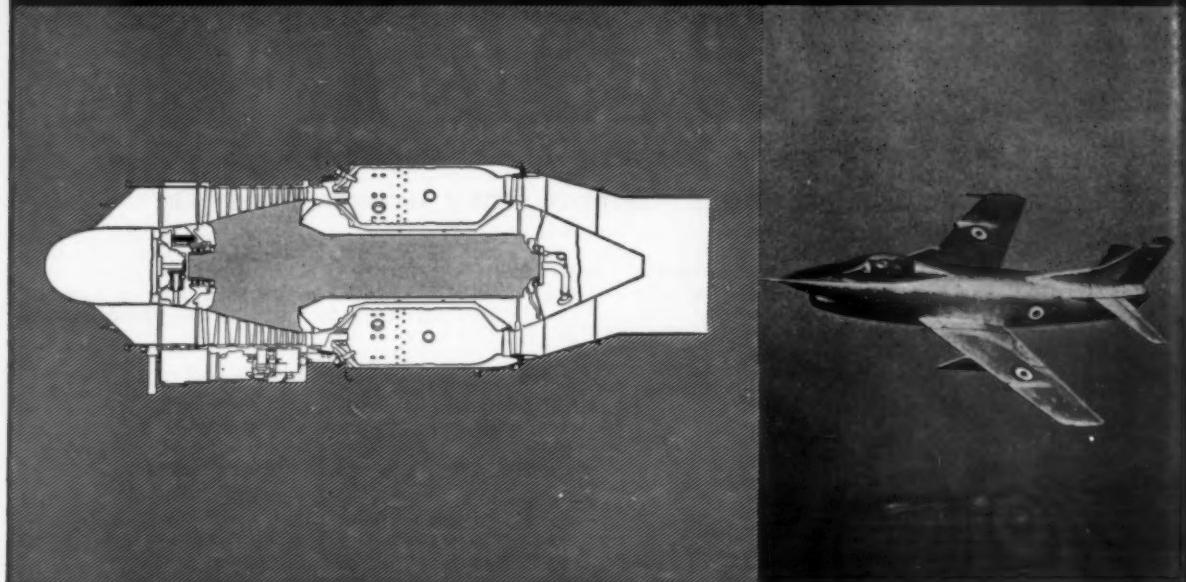
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Orpheus turbojet-already flying in 6 different aircraft-now reaches 6,810 lb thrust dry, over 6:1 thrust/weight ratio . . .



ORPHEUS 803—general arrangement showing the two-bearing layout.

...ANOTHER ENGINEERING ADVANCE BY BRISTOL SIDDELEY

The design philosophy behind the Orpheus family of engines was based on two conflicting requirements—extremely light weight and exceptional reliability. That these requirements were successfully reconciled is shown by the fact that the Orpheus has been specified in five countries for no fewer than 14 distinct types of aircraft, six of which are already flying. The Orpheus is undoubtedly the most advanced medium-thrust turbojet engine in the world and the latest version, the B Or 12, has more than twice the thrust of the original Orpheus, which first flew in 1955.

The Bristol Siddeley Orpheus B Or 12, like the earlier versions, achieves its outstanding performance through basic simplicity of design. Producing 6,810 lb thrust dry (8,170 lb thrust with simplified reheat), for a weight of 1,110 lb, the B Or 12 has a very high thrust/weight ratio of over 6:1. This is combined with

a good specific fuel consumption (0.933 lb/lb/hr at maximum continuous rpm, sea-level static conditions), very compact dimensions (81.4 in from intake flange to exhaust flange; 32.4 in diameter), and minimum servicing requirements.

Omnipresent Orpheus

The Orpheus family has a far wider range of applications than any other aero-engine in its class. The design has been proved by a remarkable record of trouble-free operation and various Orpheus versions power aircraft ranging from trainers and executive transports to research aircraft and lightweight strike fighters. The last category includes the Fiat G 91, NATO's standard strike fighter, powered by the Orpheus 803 (shown above).

The Orpheus is in production in India and Italy as well as Great Britain, and will shortly be built in Germany.



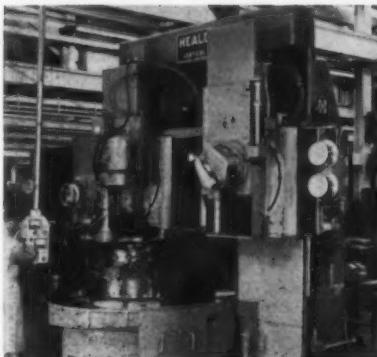
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Grinder Spurs Jet Engine Overhaul for United

Probably the most telling piece of evidence that the jet engine is changing the entire makeup of airline overhaul shops is the big, versatile and expensive (\$106,000) Heald vertical grinder now in operation by United at San Francisco. At least one other of the major trunk is considering buying one.

The machine tool was only installed about a month when it went a long way toward paying its freight. When UAL decided to up the thrust on JT3C-6s in DC-8s a few months before start of service, it looked like the best the shop could handle was two of every three aircraft. With the Heald grinder, however, United was able to better its schedule to the point that *all* aircraft were modified by the target date.



New Heald vertical machine installed at United Air Lines for jet engine overhaul is capable of a variety of grinding, boring, facing, turning and associated operations.

Airlines' Tulsa base. The jig avoids broken or damaged wiring formerly experienced when the rear cover was



allowed to dangle freely during overhaul work. The new jig also makes it possible to stand the altimeter on end to ease dial, marker and bar scale alignment.

Dutch Brand at Delta Stretches 75 Miles a Year

Mechanics at Delta Air Lines use enough electrical tape in a year to stretch 75 miles and the type picked for the job is Johns-Manville "Dutch Brand" plastic tape, according to DAL maintenance superintendent G. J. Dye.



Delta's mechanics particularly like the tape because it's pliable and easy to work with, says electrical maintenance foreman Charles H. Mayo. "It stretches and conforms easily to irregular surfaces. When you lay a roll

of it down, it will not pick up particles of metal or foreign matter, a problem that often exists with tapes on which the adhesive moves to the outer edge," adds Mayo.

The tape used by Delta comes in three thicknesses (.007", .010" and .020"). It is oil, grease, weather, acid, alkali, salt and fume-resistant.

Nose Gear Drip Pan

A nose landing gear drip pan that can be built from scrap materials has been developed by two Navy mechanics to simplify maintenance of Super Constellation nose steering components.

Aviation structural mechanic chiefs J. O. Scott and W. D. Hamilton of Moffett Naval Air Station collaborated on a two piece, hinged, drip pan that keeps oil off tires and simplifies cleanup operations after steering system maintenance. It consists of a 2 x 18 x 40 in. pan built in two half sections with a center cutout and fluid tight seal around the nose gear oleo piston. A tubular support fitted on the bottom rests on each nose tire.

707 Altimeter Jig

A wooden jig that protects Boeing 707 Kollsman altimeters during shop rework or adjustment brought a \$50 suggestion system award to J. E. Campbell, senior mechanic at American

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ABOUT PEOPLE



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IN THE AIRLINES

Thomas F. Huntington, executive asst. to the president of TWA, elected a v.p. Before joining TWA in 1959, he was with Cresap, McCormick & Paget management consultants.

Ray P. Minnear named v.p.-operations of Frontier, succeeding **Harvey P. Barnard**, resigned. **E. P. Dolansky** named treasurer, replacing **Preston Blatter**, resigned.

Don R. Wilson, 17-year veteran with Continental, promoted from asst. v.p.-operations to v.p.-flight. **Charles A. Bucks**, director of sales, becomes asst. v.p.-sales, and **Bennett King**, publicity director, is now asst. v.p.-publicity.

Robert J. Sherer, Bonanza treasurer, elected v.p.-finance and treasurer. **T. J. Van Bogart**, former asst. treasurer, elected comptroller and asst. secretary.

George P. Hitchings resigned as mgr. of Ford Motor Co.'s economic analysis department to join American as v.p.-economic research.

John D. Lindsay, former v.p.-traffic and sales of Frontier, named asst. to the president-civic affairs of Bonanza.

Remington R. Taylor promoted from asst. v.p. to v.p.-maintenance and engineering of Mohawk.



PLUCHEL



RUSS

Three airlines made appointments to strengthen their cargo departments. At TWA, **Stanley E. Russ**, former cargo sales director, was named system mgr.-air freight sales. **W. H. Pluchel**, 24-year veteran, becomes system mgr.-mail and express. **Howard R. Jennings**, former air freight administrator, named mgr.-freight forwarder sales. **Francis D. Terrillion**, former cargo tariffs mgr., appointed administrative asst., air freight sales. **S. F. Leib** left American to become TWA's mgr.-military and interline air freight sales, and **Douglas U. Stark**, formerly of American, is mgr. of perishable air freight sales. Eastern named **William J. Wilhelm**, former cargo sales mgr., as mgr.-cargo services. **Edward E. Skinner**, regional cargo rep. in Miami, succeeds Wilhelm. National promoted **O. M. Foxworth** from mgr.-cargo operations to gen. mgr. of air

cargo, and **H. F. Dowlen** from asst. cargo sales mgr. to asst. mgr. of air cargo.

Allegheny consolidated its sales and service management staff. **L. T. Ferguson**, former director of reservations, is gen. sales mgr., and **Robert C. Schumm** advances from passenger service director to gen. mgr.-transportation services. **Edward Lynch** is mgr. of reservations and ticket sales. **Dennis Houston**, mgr. of advertising and sales promotion, **Richard L. Plant**, mgr. of customer relations.

Richard S. Maurer, v.p.-legal of Delta, also elected secretary, and **Robert Oppenlander**, comptroller, also elected treasurer.

R. Grant Rees resigned as supervising air carrier inspector in FAA's St. Louis office to become director of operations and maintenance of Ozark.

David B. Eames, former director of food service at New York University, is Eastern's new mgr. of food service. **H. S. "Bill" Nelson** resigned from Shell Oil to become EAL's fuel facilities engineer, a new post.

L. A. McLaughlin promoted by Southern from Jacksonville sales mgr. to system supt. of stations.

Robert R. Hewitt promoted from director of schedules to administrative asst. to v.p.-sales of Northwest. **Harry C. Anderson**, asst. director of reservations and city ticket offices, takes Hewitt's former job.

Cubana Airlines promoted Capts. **Miguel Murciano** and **Armando Armengol** to operations mgr. and chief pilot, respectively.

Santiago Faz promoted by LAN-Chile Airlines from sales rep. in Miami to gen. traffic and sales mgr. of North American division, New York.

Philip Graham Bell, former BOAC system sales development engineer, named regional sales mgr., Pacific states, based in Los Angeles.

AMONG THE SUPPLIERS

George C. Stewart, formerly with Dalmo Victor Co., named v.p.-customer relations and contracts of Air Logistics Corp.

Arthur E. Raymond retired as senior v.p.-engineering of Douglas Aircraft after 35 years with the company and was succeeded by **Edward F. Burton**, who has been v.p.-engineering, transport aircraft systems. In another change, **Edward H. Heinemann**, who has been v.p.-engineering, combat aircraft systems, will become head of the company's European operations, succeeding **M. E. Oliveau**, who returns to the general offices.

Burt C. Monesmith, who has been v.p. and gen. mgr. of Lockheed's California division, appointed corporate v.p.-manufacturing. **M. Carl Haddon** takes over Monesmith's old job. He has been v.p. and gen. mgr. of the electronics and avionics division.

Don R. Berlin, president of Vertol Aircraft until it became a division of Boeing on Apr. 1, elected v.p. of Boeing and gen. mgr. of the Vertol div.

Dimitrius Gerdan promoted from dir. of engineering to mgr. of aircraft engine operations for Allison Div. of General Motors. **James E. Knott** advanced from asst. dir. to dir. of engineering.

James W. Clyne resigned as Douglas Aircraft's director of international and military sales to become mgr. of sales and service of Sikorsky Aircraft Div. of United Aircraft Corp.

Douglas Meadowcroft, formerly with Hardman Tool and Engineering, joined Tecu Inc., aircraft seat manufacturer, as asst. to the president.

James F. "Skeets" Coleman, former v.p.-marketing of Bill Jack Scientific Instrument Co., named commercial sales representative for Los Angeles Div. of North American Aviation.

Champion Spark Plug Co. realigned its aviation sales staff into two divisions. **J. E. Connor** was named aviation sales asst., and **Harry Archer** aviation marketing asst., both reporting to v.p. **Duane Strahan**.

Robert O. Flores appointed by Electric Autolite as marketing mgr. for aviation batteries.

Donald K. Marsh, who joined Greer Hydraulics last September, named gen. sales mgr.

T. N. Duncan, former mgr. of the Joplin, Mo., plant of Vickers Inc., appointed manufacturing mgr. of the aero hydraulics division.

Donald L. Rohrkemper named General Electric's commercial engine representative at O'Hare International Airport, Chicago.

OTHERS IN AVIATION

Anthony F. Arpaia, former Interstate Commerce Commission member, appointed v.p.-international services of Railways Express Agency.

Eugene Hirsch, of Seattle air route traffic control center, named to new post of asst. executive director of Air Traffic Control Assn.

Selmer J. Ronnie, of Air Transport Association's military bureau, appointed director of interline reservations procedures of Air Traffic Conference.

SALARIES

(Continued From Page 50)

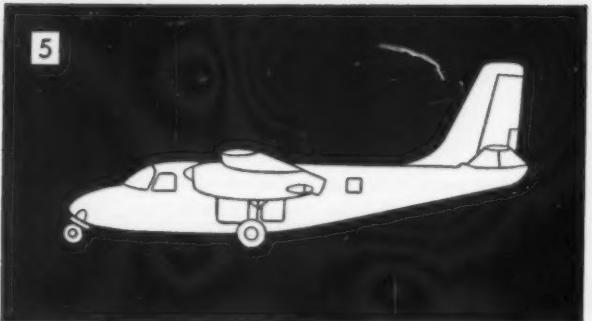
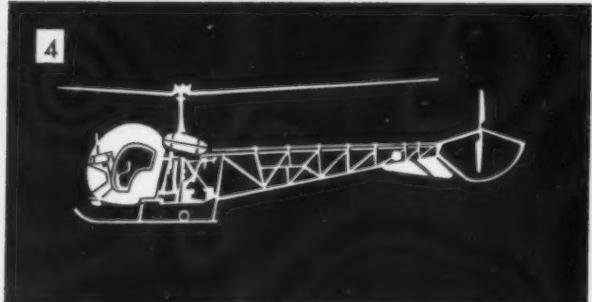
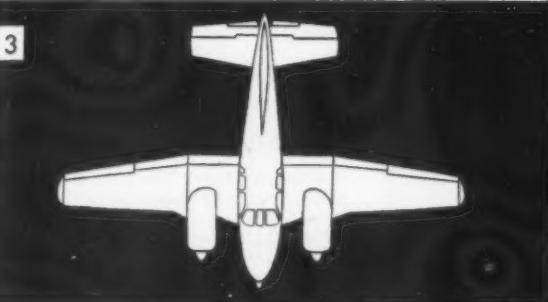
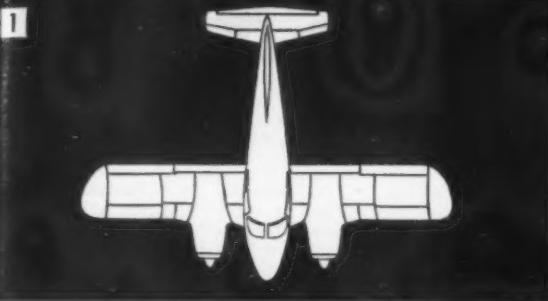
V.P.-sales, \$12,000 salary, \$3,372 expenses, no shares; **W. S. Magill**, v.p.-oper., \$16,800 salary, \$958 expenses, 800 shares; **Geo. F. Estey**, secy. & treas., \$12,462 salary, \$902 expenses, 1,521 shares; **C. H. D. Farrel**, asst. treas., \$10,654 salary, \$462 expenses, 325 shares; **C. A. Beasley**, asst. secy. & dir., \$2,400 salary, \$200 expenses, 3,500 shares; **Ike F. Jones**, v.p., \$79 expenses, 2,167 shares; **W. B. White, Jr.**, asst. secy. & dir., \$250 expenses, 532 shares.

WEST COAST AIRLINES

OFFICERS: **Nick Bez**, pres., \$18,000 salary, \$3,622 expenses, 50,793½ shares; **E. B. Code**, v.p., \$12,400 salary, \$1,294 expenses, 494 shares; **L. J. Hawkinson**, secy.-treas., \$14,400 salary, \$1,987 expenses, 55 shares; **K. N. Laurin**, asst. treas., \$8,457 salary, \$499 expenses, no shares; **Thomas R. Croon**, v.p., \$10,700 salary, \$2,670 expenses, 262 shares; **H. F. Scheurer, Jr.**, v.p., \$15,150 salary, \$2,014 expenses, 100 shares; **S. R. Severtson**, v.p., \$14,400 salary, \$1,087 expenses, 150 shares; **S. M. Selby**, v.p., \$12,000 salary, \$1,783 expenses, no shares; **Wm. Calver**, v.p., 9,523 shares; **Jas. W. Johnson**, asst. secy., no shares.

TRANS-TEXAS AIRWAYS

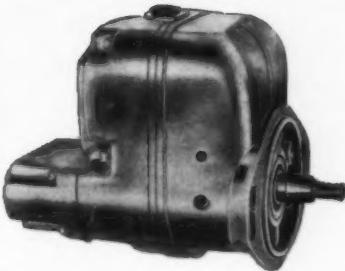
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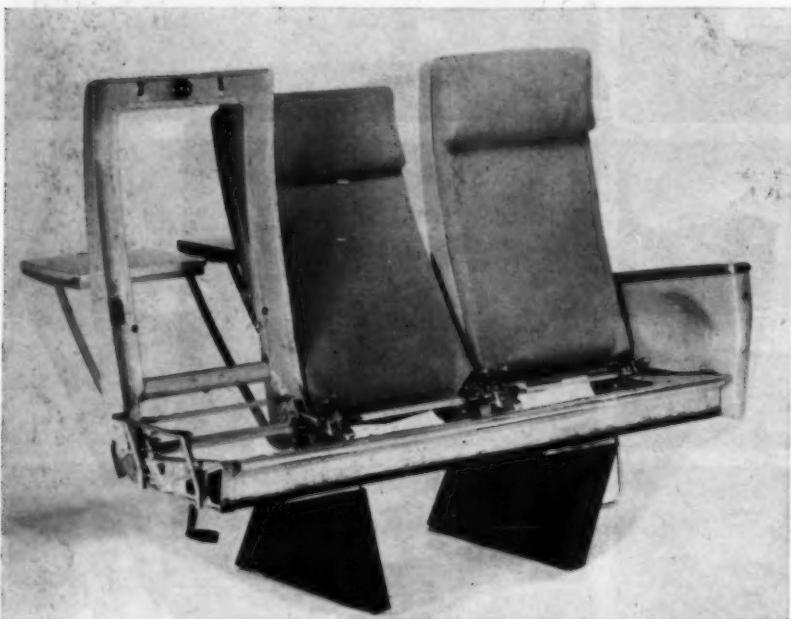
ary. A combination ignition-starting switch automatically controls starting and operation of retard breaker, magneto and booster. The S-200 magneto is typical of Bendix capabilities in delivering superior ignition equipment, including magneto systems for aircraft of all types and sizes. Write today for complete information on the S-200 magneto or other ignition needs.

Pictured above: 1. Piper Aztec 2. Cessna 180 3. Beechcraft Twin Bonanza 4. Bell 47-G2 Helicopter 5. Aero Design—Model 500

Scintilla Division
SIDNEY, NEW YORK



Aerotherm Styles 720 Seats for United



Formed sheet metal back construction of welded and riveted aluminum combines favorable strength vs. weight ratio. Access ports in back frame are provided for ease in removing or adjusting recline mechanism.

New deluxe passenger seats, developed by Aerotherm Division, Aerotec Industries, Inc., of Greenwich, Conn., specifically for United Airlines, are soon slated to enter service on UAL's Boeing 720s.

Described as "totally new" by Aerotherm officials, the 720 seats embody the design results of research into cushioning densities, Aerotherm's energy absorption approach to cabin seat structural safety and new seat contouring.

According to Aerotherm, the long standing impression that comfort is simply

a function of cushioning volume is erroneous. Softness per se, company engineers contend, is not always comfortable.

In their research into the new seat design, studies of skeletal positioning on mockup seats showed that comfort can be controlled by scientifically varying the densities of polyurethane cushioning used in the seats.

The result is a 21-inch wide seat with the front of the seat cushion designed soft and low to prevent numbness. Flexible supports under the cushion absorb seating impact loads and prevent "nerve pinching," according to Aerotherm. The seat back is sculptured and angled forward slightly to accommodate normal head and neck inclination. It adjusts to a maximum 68° recline angle.

To permit reduced seat spacing with increased leg room, Aerotherm eliminated the usual rear lateral beam at the junction of the seat and back. This was made possible by a combination of energy absorption structure and box-beam construction to reduce the seat's dead weight.

In its approach to sculptured upholstery Aerotherm perfected a technique for applying leather and plastics to aluminum using Minnesota Mining & Manufacturing Co.'s EC-1357 adhesive.

For styling, the seat uses full top grain leather, pink gold in color, on side panels, armrests, stowage pockets and backs of seats. Pink gold fabrics are E. F. Timme (New York City) Mylar Beige in combination with Collins & Aikman (New York City) light blue fabric. Aero-tablets and leg housings use Boltaron plastic.



Advanced styling, comfort and safety distinguish this deluxe seat for United Air Lines' new Boeing 720 jetliners.

In addition, the adjustable foot rest frame is satin anodized and the upholstered foot rest bar is E. F. Timme Turquoise Normandy Frieze. The new seat is designated Model 621 for first-class compartments and 619 for tourists. United has placed an order for 18 aircraft sets.

NEW PRODUCTS

Low Altitude Radar Altimeters

Sylvania Model 705 and 705A medium and low altitude radar altimeters measure aircraft-to-surface clearance from 0 to 20,000 ft., without protruding antennas or other external units.

Each system can provide altitude data to autopilots, and has a limit indicator to show flight at or below a pre-set altitude.

Continuous-service life is 300 hrs., maximum life is 2,000 hours. Total weight of control amplifier, receiver-transmitter and control-height indicator is about 19 lbs.

Write: Dept. A/L, Sylvania Electronic Systems, 63 Second Ave., Waltham 54, Mass.

Test Stand

Nankervis test stand is capable of testing all components for two engines, providing a saving of time as well as a reduction in test equipment. The stand tests fuel controls, pumps and pressurizing valves on Pratt and Whitney and General Electric jet engines.

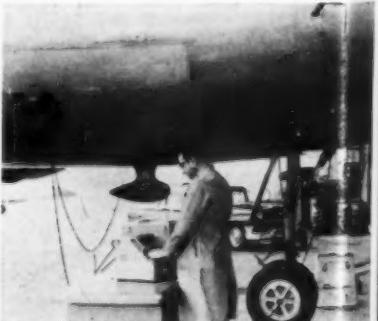
Nankervis stands are in use by Swissair, Sabena, KLM, Qantas, TEAL, South African Airways, JAL, Pan American, American, United, Delta and Eastern Air Lines.

Write: Dept. A/L, George L. Nankervis Co., 15300 Fullerton Ave., Detroit 27, Michigan.

Air Data Tester

Intercontinental Dynamics Corp. has a lightweight, portable unit which will check out the Pitot static systems of jet aircraft on the ground in about 20 minutes.

A single technician can make checks from the ground or cockpit. The unit



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JUNE,

contains vacuum and pressure pump, servo regulators, readout instruments and connectors to fit Pitot static or other vacuum pressure systems.

Model VPT-10 will also check engine pressure ratio instruments. The unit weighs 40 lb., requires 400 cycle, one or three phase, 115 volt power supply. Current users are Pan American and Braniff Airways, Inc.

Write: Dept. A/L, Intercontinental Dynamics Corp., Englewood, N.J.

Ground Power

Convair uses a new, mobile Hobart ground power unit to provide 400 cycle electrical ground power for the 880 in field operations work at San Diego.

The Hobart Model 3014 ground power unit is rated 60 KVA or 48 KW at 0.8 p.f.,



120/208 volts, 166 amperes, 3 phase, 4 wire, 400 cycle a.c. A V-8 industrial type engine of 157 HP, 549 cubic inch displacement, is directly coupled to the generator and both are mounted on a heavy steel base.

Controls for generator and engine are

located on a panel to the side of the unit where the power cable is carried.

Write: Dept. A/L, Motor Generator Corp., Troy,
Ohio.

Ear Protector

Shown is a new helmet which provides ear protection for wearers in areas of extreme noise, and near jet engines operating at full power.

The muff-type ear protectors are made



hawk Airlines. Use of the equipment need not be restricted to weekends, when few personnel are working, since equipment will not endanger health.

System uses five-gal. container, requires little maintenance, and necessitates fewer splatter precautions since over spray is minimized.

Write: Dept. A/I, Norden Corp., Amherst, Ohio.

Liquid Containers

Two containers for hot or cold liquids—a 2½ qt. model for single pilots and a 1-gal. model for executive aircraft—have been put on the market by Mansfield Aircraft Products.

A replaceable heating unit on the bottom of each container will keep hot bev-

Aircraft Paint

Aircraft paint spraying equipment which produces little or no over spray is being produced by Nordson and used by Mo-

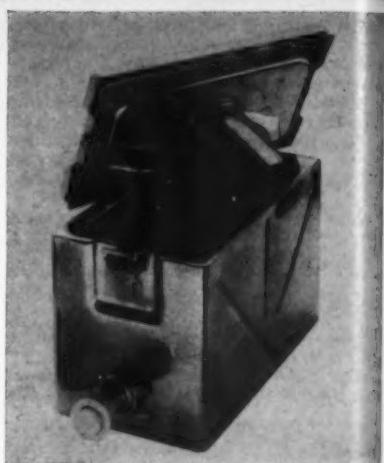


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erages between 165 and 185 deg. F. The containers may be used for cold beverages by adding ice.

The small model consumes 25 watts at 12, 28 or 115 v and weighs 9 lbs. The larger model is rated at 125 watts for equivalent voltages and weighs 10 lbs.

Write: Dept. A/L, Mansfield Aircraft Products Co., Municipal Airport, Mansfield, Ohio.

INFO FOR THE ASKING

Air generator—Specification sheets from Hispano-Suiza, Seine, Fr. tells about H.S.-48 compressed air generator cart. Information also available on an air pump and pressure switch.

Write: Dept. A/L, Hispano-Suiza, rue du Capitaine Guynemer, Bois-Colombes (Seine).

Miniature connectors—Deutsch Co. has published catalog of four basic series of Deutsch miniature connectors, with cutaway drawings and detailed specifications.

Write: Dept. A/L, Deutsch Co., Electronic Components Div., Municipal Airport, Banning, California.

Fatigue endurance—Design Manual No. 5930 from Elastic Stop Nut Corp. describes threaded fasteners said to double fatigue endurance of standard high tensile bolts.

Write: Dept. A/L (D/D), Elastic Stop Nut Corp. of America, 2330 Vauxhall Road, Union, New Jersey.

NOTES ABOUT SUPPLIERS

- Sunbeam Corp., Chicago manufacturer of portable electric appliances and other equipment, will acquire John Oster Mfg. Co., manufacturer of Adviser flight computer for Convair 880 and developer of takeoff monitor system.

- Voyce-Legier, Inc., Miami, has been appointed sales rep for the Maxim line of industrial, commercial marine and aviation silencers in Florida, Georgia and Alabama.

- Tamar Electronics, Inc., Santa Monica, Calif., has received a \$600,000 FAA contract for VOR dual monitors.

- Cessna Aircraft Co., Wichita, Kansas will acquire a minority interest in the French aircraft firm of Avions Mar Holste at Reims, France.

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\$100 Note Pries Curio From Wary Nepalese Salesman

On the ground floor under and behind a wooden staircase leading to the open gallery in front of the Hotel Royal in Kathmandu, Nepal, is a curio shop operated by a mild little Nepalese. The jaw-breaking name of the shop is shown in the photo on this page and I never did learn whether the operator, also shown in the photo, was also the owner.

No ordinary curio shop, this. Trinkets and souvenirs there were, but not the usual quantities of cheap machine-made junk unloaded so often on eager tourists. A couple of naked bulbs provided light. The display cabinets were a little dusty. The articles for sale were Nepalese and Tibetan and quite a few had religious overtones—either Buddhist or Hindu. There were, of course, the usual assortment of gems and precious stones for sale—it would be an odd shop in that part of the world that didn't have some.

But back in the corner behind the display cases was the crowning item of the shop, standing high on a box or table so that no visitor rambling by the entrance could miss seeing it. I didn't know what it was, but it captivated me from the first moment I saw it. It was a brilliant creation of gold and hundreds of semi-precious stones in a basic medallion design of concentric circles. It was a yard in diameter. On top it had a queer looking appendage and at the bottom were two metallic feet, as per the photo on this page.

I've roamed through miles of museums throughout the world, but I had never

seen anything like this. Nor had I seen anything like this for sale anywhere. At least I assumed it was for sale.

I asked the price. In Nepalese currency, quickly converted by mental calculation into dollars, the figure was somewhat astronomical. But in Nepal, as in India and other countries out that way, prices always start at anywhere from double to ten times the final figure, unless you're a complete sucker and pay the asking.

But what was this thing? Obviously it was religious, probably from some temple. The best I could discover was that it was called a mandir, but was it Hindu or Buddhist? I haven't yet learned the full story and wish somebody would tell me. Its age is estimated at 350 to 450 years and somebody told me it was of Tibetan origin.

The key to its religious character was in the very center which opened up much like a safety deposit vault and inside is a goddess of solid metal and washed in gold.

The shop operator was obviously quite proud of this item and had quite a few photos of himself with it. I suspected he really didn't want to part with it, which suspicion turned out to be true. This mandir was a sales leader, an attraction to get tourists into the shop.

Having heard the asking price, I decided it was useless to try to bargain for it. I didn't have enough time. Bargaining in Nepal should cover days and weeks. And anyway, suppose I did buy it, how would I get it to the U.S.? The only transport was by air and the airfreight would run high even if somebody could crate it properly. And suppose the Nepalese government wouldn't let it out of the country? And suppose the Indian government put an embargo on it somewhere between Patna and Bombay?

But I kept going back to the shop and taking another look. The more I did so, the more determined I was to make one big pitch, win or lose. On the last morning in Kathmandu, several hours before leaving for the airport, I sought out Boris, the Russian who runs the hotel, and asked him what he knew about the mandir and my chances of buying it for a reasonable price.

Boris knew all about it. He said many people had tried to buy it but could never get together on a price with the shop guy. He confirmed my suspicion that the shop operator really didn't want to part with his prize possession and kept the price up for that reason. He said he had

And here is the mandir in its present location on the fireplace in the Washington home of WWP. The head piece and feet have been stored.



This is the mandir purchased in Nepal, shown with the seller. Note feet on bottom.

had a letter only that week from an American who had been in Nepal several years ago and was asking Boris to make another effort to get the mandir for him, the American having failed up to that point.

With a shrug of his shoulders, Boris said okay, let's try. He took along with him an Indian who was one of the assistant managers of the hotel, and the three of us descended on the Nepalese.

Boris and the Indian really moved in. I've rarely heard such a mixture of languages—Nepalese, Indian and English. They told the shop operator that here was a customer who really wanted the mandir and that others had wanted it and why not take up this offer right now and get the thing out of the hotel.

As I sidelined the sales pitches, I drew a \$100 greenback out of my wallet, the only such bill I had left following my trip through Europe, USSR, Siberia, Central Asia, Afghanistan and India. The greenback proved to be the key. Boris spotted it first. He showed it to the Nepalese, who seemed considerably impressed. (I should add that this was in the fall of 1958 and not many Americans with greenbacks had been to the country at that time.)

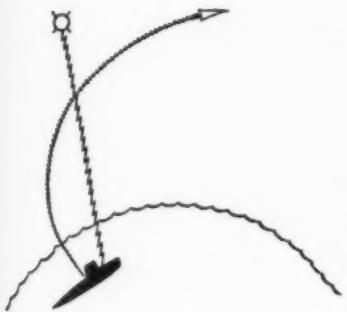
The little Nepalese finally gave me a price which was acceptable, with the \$100 as down payment. I was to send the balance when I got back to Washington. Meantime I would get word to Jules Gindraux, the TWA manager in Bombay who had Nepal in his sales territory, to somehow work out the shipping, and the curio shop operator was to await instructions.

A bill of sale was made out, and the shop guy and I clasped our hands together and bowed, in Nepalese fashion, to seal the deal. I insisted we shake hands western style, which we did.

Poor Jules Gindraux! He had told me in New Delhi during the IATA meeting that if he could do anything at all for me, but anything, just say the word. So now I had a real chore for him. Get the mandir safe and sound to Washington. Somehow or other, I just never quite believed I'd ever see it again. But that's another story for the next issue.



How engineers
will hang
an electronic "star"
to simplify
navigation



Anyone who has ever groped his way in the dark or navigated a ship in a fog will appreciate the promises this Space Age project holds forth . . .

A U.S. Navy satellite program is now in progress to improve the ancient art of celestial navigation.

A network of solar-battery satellites will encircle the earth, continually transmitting data that can let ships and aircraft figure their positions simply by tuning to the satellites. Submarines and long-range missiles may also use the system.

While the satellite network is still in development, Douglas *Thor* —the booster that can lift it into space—is already operational. It has proved highly reliable as the prime booster in the Air Force “Discoverer” firings and launched the first nose cone recovered at ICBM range.

Thor is another product of the imagination, experience and skill Douglas has gained in nearly 20 years of missile development.

The dependable Douglas *Thor*, prime booster in new multi-stage missiles, can launch satellites—or shoot for the moon.

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BOEING 720

